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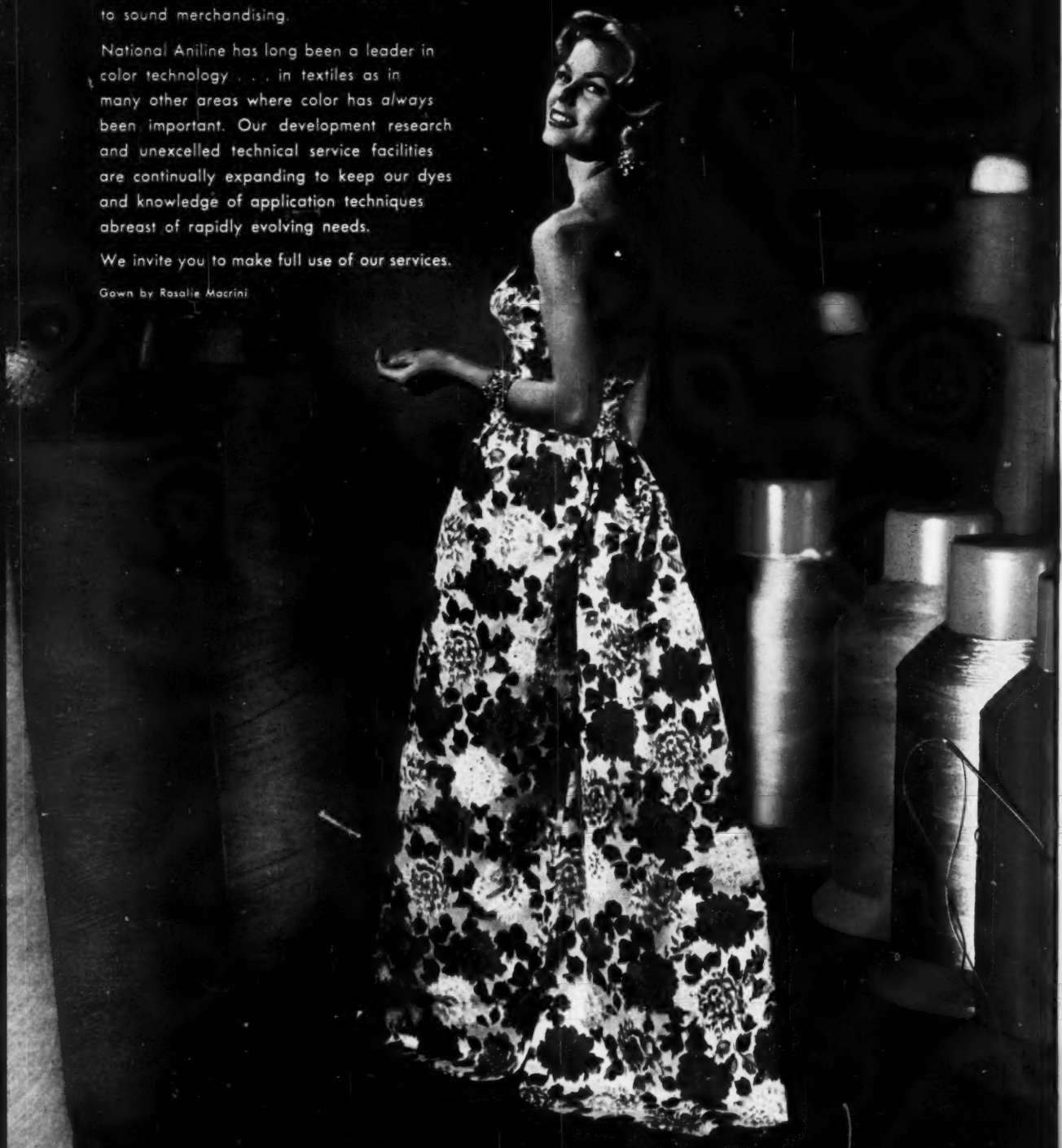

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Niagara Frontier Section———

PROGRESS IN THE ART OF BLEACHING*

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INTRODUCTION

THIS year there have been various functions taking place in the United States, Canada, and Europe commemorating the 100th anniversary of Sir William Perkin's discovery of a method for preparing a synthetic dyestuff. It was truly a wonderful discovery which proved to be the forerunner of a huge industry that has contributed greatly to the well being and pleasure of mankind. Nevertheless, we are all aware that the coloring of cloth originated hundreds of years prior to this discovery. In fact, historians can only guess at the earliest times in which man decided a colored piece of cloth helped to relieve the monotony of his life. Those references to the primitive use of color also note that white cloth was considered a luxury and a mark of the "upper class" in the social scale of those times.

Tonight it is our intention to turn our thoughts from the coloring of cloth to the means of making white cloth for great strides have also been made in this art. We think it would be well to pause at this time to look back over the road traveled this far, set a clear fix on our present position and then look ahead to the future as best we can.

Let us point out at this time that the greatest advances in the technique of bleaching have been made in the last 25 years due to research and development work carried out right here in the Niagara Frontier. Therefore, we think it particularly fitting for the Niagara Frontier Section to take notice of these accomplishments.

*Presented before the Niagara Frontier Section on November 2, 1956.

B K EASTON

The authors have traced the history of bleaching from earliest times to the present. Interesting high lights on early procedures are related. It is noted that the advances made in the field of bleaching are the result of arduous efforts on the part of the chemist in his laboratory, the engineer at his drawing board, and the practical know how of the bleacher in the plant. Several very recent developments for bleaching cellulosic and protein fibers are discussed.

EARLY HISTORY OF BLEACHING

In tracing the progress of this industry, we have no intention of conducting a history lesson. However, we think it will be of interest for us to cite a few early events related to this art. For instance, we read that in 300 BC a Greek ship laden with linen and a form of lime for bleaching the linen was destroyed when water accidentally reached the lime. Those people had already recognized the value of an alkaline scour which was accomplished by boiling the cloth in an alkaline solution made from the ashes of plants. In fact, a rather thriving business was created, the manufacture of crude soda ash by burning seaweed. The first recorded bleaching procedure consisted of alternately scouring the cloth and then laying it in the sun or "grassing" as the operation was called. To obtain some degree of white on linen, which was the common material used then, it was necessary to repeat this cycle many times and sometimes the operation required several months. The first improvement made in this procedure came when a sour was injected between the scour and "grassing." The sour consisted of placing the cloth in buttermilk or sour milk and stamping it with the feet. At this point we begin to recognize the sequence of scouring, souring, bleaching which has existed in one form or another right up to present times. Surely, improvements were made in the alkaline scour, vitriol and muriatic acid replaced sour milk, and different chemicals have taken over the bleaching job. However, "grassing" remained a part of the procedure well into the 1800's. We read of many heated arguments arising in England, Scotland and Ireland over the acres of land used for "grassing" that could well have been used for farming.

About 1788, chlorine was first used for bleaching. Then in 1837, we find that pressure boiling was coming into use although the frequent explosions placed the operation in the hazardous occupation class. The kiers were then made with large

slabs of stone held together by iron straps. By mid 1800's, the technique for bleaching was pretty well established and we find the greatest improvements were being made in machinery. This situation existed into the first quarter of the 20th century. At that time, much of the cotton cloth was being kier boiled, soured, bleached with chlorine in the form of sodium or calcium hypochlorite, and again soured. In fact, that procedure or modifications of that procedure are still in use.

In the 1920's successful electrolytic methods for the commercial preparation of hydrogen peroxide were developed in the United States, and we find ourselves at a start of a period which saw hydrogen peroxide slowly and then rapidly overtake chlorine products as the bleaching agent. At first hydrogen peroxide was used to bleach colored yarn fabrics since it was possible to scour and bleach in one operation with no deleterious effect on the colors. Soon thereafter, it was found that the entire sequence of kier boiling and bleaching could be carried out, if desired, in one kier. The substantial reduction in cloth handling afforded by such a procedure attracted the technicians and opened the door for further developments of hydrogen peroxide bleaching methods.

ADVENT OF CONTINUOUS BLEACHING

Around 1930, it was found that by saturating cloth with a fairly concentrated alkaline hydrogen peroxide solution and allowing the cloth to stand for at least 7 hours before washing, a good bleach was obtained at room temperature. Thus the Becco Cold Bleach *(1)* system came into use and is still today a very popular bleaching procedure. It was only a step then from the cold bleach procedure to the development of a steam bleaching method and continuous bleaching systems.

In late 1931, laboratory scale equipment for steam bleaching was set up at the Lockwood-Dutchess Bleachery in Wappingers Falls. The work done there led to a patent application by Clarke and Smolens of the Buffalo Electro-Chemical Company in 1932 which was issued in 1936 *(2)*. This patent became the "Granddaddy" of various J box patents that were to follow. As so often happens with new ideas, commercial application was slow at first. After all, the efficiency of kier bleaching with hydrogen peroxide was vastly improved due to work done in the laboratories and textile mills by the technicians of the two major peroxide suppliers. The larger textile mills were switching from chlorine to peroxide at an increasing rate so that the picture looked pretty bright for the peroxide manufacturers. Fortunately, those in research kept looking ahead and in 1938 plans for a J box system suitable for commercial operation were drawn up by the chemists and engineers of the Buffalo Electro-Chemical Company and the equipment was then constructed. Early 1939 saw this first J box system go into service at the Edgewater Dyeing and Finishing Company in Philadelphia. This box was used from then until the end of World War II when from an engineering viewpoint it was judged to be obsolete and was scrapped. Boott Mills, Cannon Mills, Renfrew Bleachery and a few others installed either Becco or duPont designed equipment around 1940 before World War II interrupted the swing to continuous peroxide bleaching because of restrictions on stainless steel. However, in 1946 the transition was restarted and this time the acquisition of equipment for peroxide continuous bleaching systems moved ahead by leaps and bounds. Today there are in use in the United States over 110 J box installations. Some are single J box but most are two or more J box systems.

An interesting fact comes to light at this point. Several of the first installations used a so-called single stage system. In fact, one plant operated such a system for bleaching towels right through to the end of World War II. However, mill men and the peroxide technicians were of the opinion that better results were obtained when both the alkali and the peroxide treatments were carried out at or near the temperature of steam. So, except for knit goods and some colored yarn bleaching, the swing was entirely to a two-stage system and in recent years even the desize is carried out at high temperatures. Now I am told that today's styles for ladies' hats are a revival of those in use about 25 years ago with slight changes. Well, the same thing is now being done in the bleaching industry. The original single stage procedure has been dusted off, prettied up and is now receiving favorable attention for restricted uses.

While the two peroxide manufacturers were pressing along with J box developments, another Niagara Frontier industry developed a system for steam treating cotton fabrics in the open width which became generally known in the industry as a conveyor type steamer. This system was originally developed for bleaching with sodium chlorite. However, for various reasons the textile industry in the United States has not been receptive to this bleaching chemical. Nevertheless, the equipment could be and is now used for peroxide bleaching. Today there are at least 12 such installations in the United States.

We realize we have spent considerable time on peroxide continuous bleaching. But after all, this development certainly marks a very prominent milestone in textile history. From the very inauspicious start in 1931 to the present, where it is responsible for bleaching at least 75% of all cotton fabrics, we have seen perhaps the greatest transition in the shortest period in the dramatic and romantic history of the textile industry. You can be sure that progress in this phase of bleaching will not stop where it is today. So let us look at the very latest developments and try to predict what tomorrow holds for us.

LATEST DEVELOPMENTS IN CONTINUOUS BLEACHING

About a year ago Becco Chemical Division announced the availability of a bleaching process for cottons *(3)* which did not use sodium silicate as the stabilizer. This long sought improvement was based on the use of an orthophosphate to form calcium phosphate which is an adequate stabilizer of hydrogen peroxide. Early this spring a second non-silicate bleaching procedure for bleaching cotton became available to the industry through the issuing of a patent *(4)* to the same company based on a polyphosphate formulation. We think local plant conditions will largely dictate which procedure will be used.

As you know these procedures were developed with the idea of eliminating trouble from scale build up in the J boxes and other equipment and to reduce as much as possible the faulty dyeing due to residues of complex silicates left in the cloth. Now we find mill technicians looking at these procedures for an entirely different reason. Metallic effect threads are becoming quite popular in towels and other items. They also have been creating headaches for the bleacher because these brilliant looking threads appear to be somewhat allergic to alkali. It has been demonstrated that

either non-silicate formula will satisfactorily bleach the cloth without any significant effect to the metallic thread. Furthermore, during these trials it was found that the lower pH range of the non-silicate formulations left towels with a more pleasing "terry hand." We think this development is significant and expect other such applications will come to light in the near future.

There seems to be a great amount of interest centered in seeking means of speeding up the actual bleaching reaction and still maintaining adequate control of the process. Becco announced last spring the development of a high speed bleaching procedure that would be applied to open width processing. We have repeatedly obtained excellent bleach results in the laboratory in 2 to 3 minutes. Because this must be done under pressure, an entirely different type of equipment is needed. Several machinery manufacturers are interested in this problem, but as you can well see, it is no easy trick to continuously take cloth in and out of a chamber where a substantial pressure must be maintained. We hope the problem will be solved in the not too distant future.

As you might expect, while reducing the bleaching time from the generally accepted 1 hour to the 2 to 3 minute cycle, we learned how to carry out bleaches at most any chosen period of time between those mentioned. The fifteen minute interval looks very interesting, for this can be done at normal atmospheric pressure. Still it is a short enough time to allow definite reductions in the size of equipment required for open width bleaching. We have been advised that newly designed equipment for such a procedure is now available from either of two equipment manufacturers.

Just what is to be gained by speeding up the bleach reaction other than a possible reduction in the size of equipment is somewhat of a question. A shorter reaction time does not mean an increase in yards per minute production. Actual production rates are pretty much governed by the efficiency of the washing equipment. However, many medium and small sized mills handling constructions of cloth requiring open width bleaching were prevented from going to continuous bleaching due to the high cost and/or the space requirements of the proper equipment. These procedures may be the means of opening the way for such companies to install continuous systems and obtain the savings in labor and utilities common to continuous bleaching.

PACKAGE BLEACHING

Now we want to turn to package bleaching of cotton yarns and two important Becco developments. As to be expected, they run parallel to developments just discussed in continuous bleaching of fabrics. First, is steam bleaching of packages; second, is bleaching at temperatures above 212°F. Both bring about a marked reduction in total processing time and in some cases a moderate reduction in chemical consumption. These methods have not been discussed to any great extent and we think they might be of sufficient interest to look over a few details of the procedures.

Steam bleaching is the older of the two procedures and several companies are now set up to use it. Essentially, the operation proceeds in the following manner:

After loading the yarn into the machine, the bleach solution is run in from a storage tank. Circulation in alternate directions runs for a total of 10 minutes after which the solution is pumped back to the storage tank. Air is then forced through the yarn from the outside-in to extract the solution in the packages to about 110% saturation and clear the expansion tank and lines of any residual solution. The packages are then steamed, starting with the inside-out direction, for 5 complete cycles of 2 minutes in each direction for a total of 20 minutes. The yarn is then rinsed and finished as usual. Allowing a total 1½ hours to accomplish the usual 3-15 minute rinses after bleaching, which is very generous, we find that the overall processing time is between 2 and 2½ hours

Of course, this system requires certain changes to be made to the machine. However, the mills that are now adopting this procedure have set aside one machine for saturation and steaming. The yarn is then moved over to other machines for rinsing and finishing. While steaming is taking place, the solution pumped back to the storage tank is brought back to the necessary volume and proper strength to be ready for the next load.

The second method is the most recent development and had its first plant trial only a few weeks ago. The trial turned out very satisfactorily and proved to be one of those rare instances where a procedure developed in the laboratory was very successfully adopted to plant conditions without any changes. It must be noted that this method is applicable only on package machines designed to operate at temperatures above 212°F.

After the yarn is loaded into the machine, hot water is run in plus the wetting agent and sequestrant if used. This solution is circulated for one complete cycle of 2½ minutes in each direction. At the start of the second cycle, the alkali, sodium silicate and hydrogen peroxide are added and circulation is continued to complete the cycle. The temperature is then raised to between 220° and 225°F. where it is maintained for a maximum of 30 minutes. Temperature and pressure are then lowered, the charge is dropped and rinsing takes place in the usual manner.

Before leaving the subject of package bleaching, we think it would be well to point out that regardless of the system used there must be an adequate supply of steam to the machine. Several times we have been asked to survey an existing set up to see if recommendations could be made to shorten the total processing time. Our survey disclosed that much of the present processing time was used up in heating the bleach solution as well as the rinse water to the desired temperature all because of an inadequate steam supply. Please do not forget this very important point when planning changes in your bleachery.

PROGRESS IN BLEACHING SYNTHETICS

Now let us turn to rayons and synthetics. Unfortunately, the history of bleaching developments for these fibers is not as dramatic as described for cotton, nor for wool which will be discussed shortly. Rayons have been bleached using modified cotton procedures, such as kier bleach, cold bleach, yes, even continuous steam bleach. Some improved procedures were developed in 1948 when peracetic acid was made commercially available by Becco.

Of the truly synthetic fibers, the nylons respond very nicely to bleaching with peracetic acid. Until recently sodium chlorite has yielded the best bleach result on the acrylic and polyester fibers. Now, following a steady improvement in the manufacture of these fibers, we find it is possible to obtain very nice bleach results with peracetic acid. Furthermore, we are finding indications of better light stability of the whites resulting from peracetic acid bleaches.

PROGRESS IN BLEACHING PROTEIN FIBERS

Even though the progress and the development of animal fiber bleaching has not been as rapid and as spectacular as that of the cellulosic fibers, it has, however, shown some significant advances in the last century.

The two most common bleaching methods, one of which was in use since the early days of the Roman Empire, consisted of either placing the wool on top of burning sulfur, a process known as "stoving" or steeping the material in a solution containing bisulfite and sulfuric acid, thus utilizing the liquid method of bleaching. While either one of these methods succeeded in considerably lightening the appearance of wool, neither one was capable of imparting to it a permanent bleaching effect.

The use of barium peroxide for silk and wool bleaching in 1875 opened the way for the utilization of hydrogen peroxide for the same purposes. This was only a natural development since at that time hydrogen peroxide was manufactured mainly from barium peroxide. With the electrolytic production of stable solutions of high concentration, hydrogen peroxide has since replaced almost in its entirety the SO_2 procedure of bleaching wool. Some stoving is still being done today, but mainly in conjunction with peroxide bleaching and only as an aftertreatment.

The methods most commonly used for bleaching wool with hydrogen peroxide are the immersion steep method which consists of placing the material in a circulating or stationary solution and allowing it to remain there for a definite period of time, the cold bleach process which requires the impregnation of the wool with the peroxide solution, then storing it at room temperature for times ranging from a few hours to overnight or longer, and the peroxide dry-in bleach.

In most instances, it is essential that the material be thoroughly scoured before bleaching so as to remove the grease and also some of the impurities that might cause a rapid decomposition of the peroxide solution.

An interesting development in the peroxide bleaching of protein fibers was the search for a chemical which would have the dual purpose of stabilizing the peroxide bath as well as buffering it. Wool itself has some stabilizing effect on the decomposition of peroxide, but the inclusion of an alkali such as sodium silicate had the added advantage of raising the pH of the bath to a higher value and still controlling it carefully. But even small quantities of silicate sometimes present the disadvantage of imparting a harsh hand to the material. To overcome this, tetrasodium pyrophosphate, and sometimes sodium tripolyphosphate, have become increasingly popular for wool bleaching and are used either alone or in conjunction with some ammonia.

It was mentioned earlier that the peroxide dry-in bleach is one of the three most commonly used methods for bleaching wool. This process makes use of the scouring train to its fullest advantage. Peroxide and sulfuric acid are placed in the last rinse bowl before the wool enters the drying unit. It is in this unit that most of the bleaching action takes place, although some further improvement is noted after storage in the bins. Of course, the degree of bleach is by no means outstanding, but this process has been found to give an overall lightening of the fibers, greater uniformity and a marked improvement in the appearance of the wool after dyeing.

It is fitting here to mention that when dyeing peroxide bleached wool, careful attention should be given to the complete removal of residual peroxide from the fiber. This is especially true where insufficient washing takes place. In such a case, a treatment using a small amount of a reducing agent or catalase, may be employed. This applies to all bleaching methods whether steeping, ageing, or dry-in bleaching. By this treatment we assure ourselves of the removal of residual hydrogen peroxide and avoid later difficulties in the dyehouse.

With hydrogen peroxide well entrenched in the bleaching of wool, many people have turned to the possibility of bleaching the darker and finer animal fibers by the same processes. Many years of active research were undertaken in this direction due to the unusual resistance exhibited by the pigmented fibers toward straight peroxide bleaching. It soon became apparent that a more effective process was necessary which would result in greater color reduction.

The idea of employing a metallic salt, as a preliminary treatment to bleaching, was by no means a new one, but the method of applying it, the proper metal to use and the necessary ingredients and conditions of the bath were factors which had to be determined very carefully.

The use of an iron salt such as ferrous ammonium sulfate or ferrous sulfate in the presence of a reducing agent applied in small quantities on the fiber seems to act as a mordant on wool and permits the hydrogen peroxide to exercise fully its action upon these pigmented protein fibers. As stated above, these facts were known to the trade but presented the difficulty of creating very unstable solutions due to the catalytic action of iron.

The Becco Research Department has been able to overcome this situation by introducing an acid-peroxide step between the so-called mordanting treatment and the alkaline peroxide bleach itself. Thus, it is possible to control the stability of the bath by the following sequence of operation:

1) Mordanting treatment which consists of impregnating the fiber with a metallic salt.
2) An acid-peroxide treatment which uses peroxide in presence of an acid, preferably oxalic, and
3) An alkaline peroxide bath similar to the one used in the conventional wool bleaching process.

This procedure can be used for both raw stock or piece goods with only slight modifications and has become increasingly popular with the industry for the bleaching of such fibers as alpaca, camel hair, cashmere, and other protein fibers.

CONCLUSION

And so tonight we have boarded a magic carpet, as it were, and touched briefly here and there at some of the milestones in the centuries' long road marking the progress in the art of bleaching. We have endeavored to show the arduous progress in the bleaching of cellulosic, synthetic, and protein fibers until today we have reached what some might consider as the ultimate in bleaching. However, research is continuing. Improvements coming from the machinists' drawing boards and the chemists' laboratories will, no doubt, in the near future relegate some of today's procedures to a position similar to some of those reviewed tonight.

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(1) US Patent No. 2,107,297
(2) US Patent No. 2,029,985
(3) *Am Dyestuff Reptr* **44**, P745-8 (1955)
(4) US Patent No. 2,740,689

Perkin Centennial———

HISTORY OF THE ART OF TEXTILE PRINTING*

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The early printing art, as evidenced by records of the Egyptians, Hindus and Javanese, encompassed wax resists, hand stamping and drawings employing combinations of vegetable dyes in harmonious patterns. The advances in the use of metal salt mordants to fix these vegetable dyes did not reach Europe for many centuries. The earliest European prints employed colored pigments fixed upon the cloth with various varnishes, but the prohibitions against importation of Indian calicos around the beginning of the 18th century fostered home arts. Various print shops were successful, after early failures, in translating the dyers' art of mordanting vegetable dyes to obtain prints which were fast to wear and washing. Block printing gave way to cylinder printing and the Perrotine, and these in turn gave way to the intaglio roller prints. Today we use hardly any vegetable dyes. The technique of textile printing is a function of the chemical nature of complex synthetic dyestuffs.

INTRODUCTION

AS WE review the history of the of textile printing, it will become evident that the development of textile printing proceeds on three fronts simultaneously—the artistic, the mechanical, and the chemical. Sometimes one or the other forges ahead, leaving the others to catch up as best they can. During the long centuries preceding the industrial revolution, the artistic front strode far ahead. During the busy years from 1780 to 1860, the mechanical front far outstripped the others. With Perkin's discovery of mauve in 1856, it was the chemists' turn.

HISTORY

Just as the beginnings of the art of making cloth are lost in antiquity, so too are the origins of the first ornamentations of textile fabrics by stamping or printing.

Decoration is the first spiritual need of man, as Carlyle has pointed out. Pictorial representation was the earliest form of art, and color its most gratifying aspect. Primitive peoples used to decorate their garments with figures of animals, which they painted on with earth pigments. Such colorants of course did not last long, as they were not fixed. We may assume that the first figured painting was done with brushes.

The ancient Egyptians produced linen cloths of fine construction. The walls of the tomb of Beni Hassan (circa 2100 BC) depict figures costumed with fabrics patterned in small conventional motifs in blue, amber and brown. Mummy cloths of later periods were decorated with printed borders in various colors.

One of the earliest attempts at printing to come down to us is a fabric with a red and blue pattern, found near Thebes and dated 1594 BC. It is finished with loops at the top, evidently for hanging, as it is a stiff piece of cloth and obviously not washable.

In the Far East, the Indians and Chinese were known to have printed cloth as early as 500 BC. We have writings of Roman and Greek travelers to India which tell of flowered garments made of fine muslin, which the Hindus wore. The Persians and Hindus understood the art of painting mordants on cloth, then dyeing in vats to produce fixed colors.

There is a much-quoted passage from Pliny, which is open to some textual criticism. Writing in the 1st Century AD he explained how the Egyptians produced patterns on cloth:

> "They dye cloth in a wonderful way," he stated. "First they place colorless substances on the cloth, then dip the cloth in dye liquids, after which it is seen that the dye has taken only where these substances have been applied. Also, without changing the dye liquid, different colors are dyed where different (basic) materials have been applied."

Thus it would seem that the dyers of the ancient world had anticipated the printers of Europe by nearly 2,000 years.

Von Kurrer wrote:—

> "When we consider how old the Hindu civilization is, and how many thousands of years it has flourished, we must conclude that they understood the art of printing long before the Christian era. It should be pointed out that the process was tedious and costly, as the patterns were laboriously painted in by hand, a method of application so different from the later European methods, that it is a question whether it can be described as printing at all."

The Incas did block printing on cotton cloth, as evidenced by a scrap which antedates the discovery of America. Among the gifts which Cortez sent to King Charles V of Spain were fine cottons finished in painted patterns, which the Mexicans had produced with indigo and cochineal.

Evidence that printing with wooden blocks was practiced from very early times exists in the discovery of small wooden blocks, no larger than a spool of thread, found in Egypt from the 4th Century AD. This is a form of printing in which the pattern, or a small portion of the pattern, is cut out of wood, and this stamp or die is used to transfer color onto the fabric in much the same way that we use a rubber stamp today. These blocks could also be used to apply wax resists. Cottons unearthed at Akhmin on the Lower Nile exhibit a blue dyeing resisted in a regularly repeated pattern by this method.

Wax is used in producing batik, a classic form of printing, which, although it stems from earliest times, is still practiced today for its beautiful effects. The ancient Javanese, with whom we associate the art, used yellows, reds, browns and blues, the combinations of which imparted harmonious colored patterns to silk scarves, cotton sarongs and turbans.

The fabric to be patterned is well scoured, beaten soft, and then sized with a thin paste of rice starch to give the artisan a firm working background. Each piece of cloth must be done singly. It is mounted on a frame and the lower end held down with a weight; then the melted wax is applied from a little cruse. After cooling, the cloth is dyed with cold dyeing colors, with many of which the Javanese were familiar. When the dyeing is complete, the fabric is put into boiling water where the wax melts and floats on the surface, and is skimmed off.

*Presented on September 13, 1956 during the Perkin Centennial celebration at the Waldorf Astoria, New York, N. Y.

The cloth is dried, and the process repeated in another pattern and another color, producing multi-colored effects. While the cloth is being handled in the dye liquid, cracks appear in the wax, and the color finds its way into these cracks. The finished dyeing therefore shows the characteristic appearance of these very fine lines in the resisted portions, which is the "water mark" of the true batik.

Other materials besides wax can be used, and the design can be applied through a stencil, as is still done in Japan, or by means of carved wooden blocks.

Stamped fabrics have been preserved to us from ancient times. The oldest piece of printed cloth which shows the imprint of the wooden block was found in Greece, and dates from the 4th or 5th century BC. There are many relics from India, but it is not possible to say whether the patterns were applied with blocks or by hand with a brush. There is a shred of patterned cotton cloth from North Africa which reaches back to the 6th or 7th century AD, at which time North Africa was part of the Byzantine Empire.

Printed cotton and silk cloth was known long before printing on paper. Although printing with carved wooden letters on paper was known to the Chinese over a thousand years ago, printing on textiles had been practiced for centuries by peoples of many countries. It is logical to expect that the picture preceded the word, and that figured cloth should be known before letter imprinting. Still, the history of the graphic arts is a strange yarn, the strands of which are difficult to unravel.

The technical advances in the use of metal salt mordants which were understood in India in the time of Alexander did not reach Europe for many centuries. On the other hand, the art of weaving intricate patterns with dyed threads and gold lamé attained a consummate perfection. Although wood engraving was used in Europe for illustrating books as early as the 15th Century, it was not until the latter part of the 16th Century that textile printing was practiced to any great extent, although we have proof of earlier attempts.

The Historical Museum in Basle has a linen tapestry fragment representing recurring figures in red and black which might have been produced by wooden blocks. From the peculiarities of costume of the figures in this tapestry, its origin can be estimated to have been around 1350.

Other early forms of decorating fabric were employed. By using a stencil cut from stiff cardboard, dye solutions or pigment pastes can be applied by means of brushes, in the same manner that we stencil letters onto crates and cartons.

There was another method of printing which was practiced about this time, wherein silk or velvet was printed with a sticky paint, then dusted with gold dust or silver dust, producing an imitation of the expensive gold lame brocades. Such cloths were used by churches as altar cloths, wall hangings and coverings for relics.

It was probably the monks, who, in their quiet seclusion, indulged in this art of printing. As in the Romanesque style, the few relics we have depict fabulous animals, and by examination these prints show that they were made by impression of several small stamps.

There is a description of a method of applying engraved wooden plates for cloth printing, written by Cennini of Padua in the beginning of the 15th century. He tells of a frame over which the cloth is drawn. A block which has been dipped in the sieve of color, is laid upon the cloth in the frame-work, exactly fitting the frame or a portion of it. Then the back of the cloth is rubbed against the block with a little buckler.

About 100 years later, instructions for cloth printing were written by a nun at St Catherine's Convent at Nuremberg. She describes the manner in which they printed patterns in gold and silver on cotton cloth. A carved wooden block is dipped into a sieve or trough, the flat surface of which has been brushed with a film of paste mixed with metal powders. The block is laid upon the cloth and rolled with a device like a rolling pin.

An imitation of the batik style was practiced for many years in Europe. In place of the method in which the wax was applied by hand, small patterns were imprinted on white cloth with glue, clay or other adhesive mixture, after which the fabric was dyed in the vat. Selecting suitable white material, the householder would take his cloth to the printer and have it printed and dyed in the pattern and color of his choice, and in this way had an opportunity to brighten his wardrobe, table and bed linen. This type of printing was called "hot printing" because the resist was thin enough to apply only when hot. In Germany this became a popular style, and was known as "Pappreserve." The printing was done with wooden blocks, the patterns being generally small geometric or floral designs which were readily reproducible. Each print shop worked on the customer's goods (an example of job printing).

Printing with wooden blocks became wide spread. The blocks were of various sizes, but not too large to be handled with ease. As the material was spread in a tight condition on a table, the blocks could be laid upon the cloth in accurately disposed repeats, and patterns of harmoniously contrasting colors could be printed with a series of such blocks.

The color was applied to the block from a sieve or trough which floats on a gum thickening, and which was kept smeared with the dye solution by the helper, usually a boy. After the block was coated with paste from the sieve, it was set upon the cloth and tapped on the back with a mallet. This type of block printing has persisted to the present time, though restricted to small operations.

If heavy, thickened pastes were applied from hot plates, the printed pattern stood in relief. This style, called beryl printing, was popular in the early 18th Century on woolen fabrics and upholstery material.

Both of the methods outlined above, wherein the dye was resist-printed, and in the other, wherein the cloth was directly printed in color, are forerunners of the modern textile printing industry. But the dyers of yarn, and the printers of cloth in those times, in their mutual jealousy and distrust, did not cooperate with each other, or exchange information. Thus it was a long time before the printer discovered how to print with the vegetable dyes using proper mordants and fixing agents, or to use indigo, the standard dye for blue the world over. Many continued to employ colored pigments fixed on the cloth with glue, albumen or various varnishes. Changes in the condition, however, were demanded by an influx of foreign prints, mostly from India, so that new methods and new equipment had to be invented to cope with the threatened loss in trade. Not only were the Indian prints beautiful, but muslins and calicos of such fineness had never been seen before, and what particularly captured the fancy of the ladies was the chintz wear, which was a starch-slicked calico. Chintz was in vogue for everything, not only for women's and children's dresses, but for curtains, linings, upholstery, and even tapestries.

Originally, calico signified cotton fabrics which were imported from Calicut, which, with the discovery of the maritime route of the Portuguese explorer, Vasco de Gama, became an important port for trade. This in-

volved an economic revolution of tremendous dimensions. It became necessary for the governments of Germany, France and England to set up edicts to forbid importation of these calicos because the cotton dyers and wool weavers were fast losing trade. Printed silks from the Orient were as much sought after as spices and jewels.

King William III of England passed a law in 1700 prohibiting the wearing or selling of Indian silks and calicos, but the desired fabrics were nevertheless smuggled in. By 1716 there were 30 laws in England prohibiting the importation of calico. Despite these, however, the prints became more popular than ever. The East Indian trading companies carried to the continent the beautiful printed cottons of the East, which the French called Indiennes, and the demand was so great that not enough of them could be brought in, even though they were still being printed by hand in India. The Hugenots of France, who were excluded from most crafts, set up factories in India and the Indies, where they produced batiks and printed calicos. But the French government, to protect their home manufacturers, prohibited the sale of these East Indian fabrics in 1681, so the Hugenots took their art to England and Holland. Germany obtained the Indian calicos only through the maritime powers, France, England and Holland, but they became so popular in Germany that Friedrich Wilhelm had to prohibit their sale in 1721. All these stringent edicts had to be repeated many times, as was to be expected because fashion was more powerful than authority. It would have been far more advantageous to these sovereigns if they had instituted their own manufacturing industry. However, the desirability of these prints did foster a home industry. We can mention here a few of the first printers in England and Europe who had the foresight to start large operations on home-spun materials. In 1689 a print works was established at Neuchatel by Jacques Deluze, and in the same decade a calico print works was founded by Jacob Ter Gouw in Amsterdam.

In southern Germany an imaginative man named Jeremy Neuhofer was busy printing pictures on cloth with oil colors toward the close of the 17th century. When imported calicos appeared on the German market, Neuhofer, seeing the trend of the times, took up the innovation and attempted to print with the water colors, ie, the fast colors, instead of the pigments. However, he knew very little of this type of printing, so he sent his brother, George, to Holland for information. After many failures, the Neuhofers were successful, and their new achievement was called "porcelain printing" because it resembled the Chinese porcelain ware and was mostly in blue and white. The knowledge Neuhofer needed was obtained from a dyer, who, incidentally, also had the necessary license of the Dyers' Guild. He did not print for the householder, ie, on order, but his was the first example of the vertical set-up, ie, he put up printed calico for sale. At best, all that can be ascribed to those first years are certain monotone prints, crudely engraved, printed in red or faience blue, in small figures on a dotted picotage ground in a field of arabesques. By 1720 there were as many as 16 such print shops in this section, so that the government tried to impose regulations on them by issuing licenses. However, it soon became impossible to differentiate between the various steps in the technique of printing, and to assign a different guild for the dyer, the printer, the finisher, the bleacher, etc, so the entire handling of the cloth from scouring to finishing was set up in one manufacturing plant.

No history of textile printing is complete without a description of the gigantic plant developed by Johann Heinrich von Schüle in Augsburg. He was a youthful prodigy who was keeping statements of accounts for his father at the age of 8, and at 11 traveled to the marts of Frankfurt and Nuremberg to sell plain and printed calicos. In 1759, he decided to set up his own print shop for which he engaged the most famous artists, printers and designers, and eventually employed as many as 3,500 people. He, too, had a vertical set-up, and each season brought out printed cloths which were ordered sight unseen before their appearance. He set up branch establishments in other cities and his business declined only when his sons failed to exhibit their father's genius. He died at the age of 91 in complete obscurity and poverty.

In France, Christoph Philipp Oberkampf set up a similar establishment. Born in Germany, he worked at hand painting cloth in Switzerland, but at 19 left for Paris and started a tiny factory near Versailles. He cut his own forms and did all the work himself, and eventually broadened his occupations till he employed 1,500 men. Oberkampf was the first to introduce the new print machine of Bell into France, around 1800. He actually had his own materials spun and woven from raw cotton, but when Napoleon succumbed and France was defeated, his factories became deserted.

Both von Schüle and Oberkampf catered to the fashion which the imported Indian calicos had made popular.

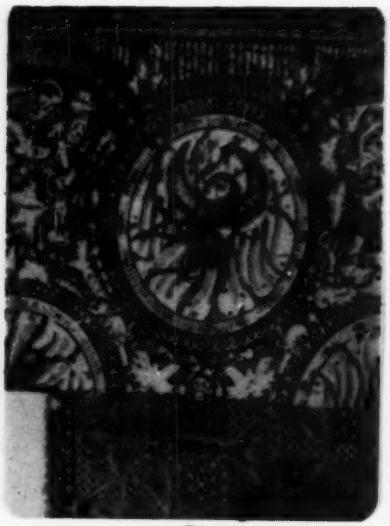
In England, the cotton printer, Robert Peel, was more fortunate. He acquired a title, his plant prospered, and his grandson became prime minister.

Print shops sprang up in all localities, in Switzerland, Bohemia, Austria, Italy. A French refugee set up a small shop in Richmond on the Thames in 1690, where printing was done on linen. One of the early and important cotton print works of England was that of J Thomson & Co. James Thomson contributed valuable inventions to the coloristic art, among them a method of printing Turkey Red, patented in 1813. A few years later he introduced the use of chromium salts in printing, and commercialized the steam fixation of applied colors.

In the early days of printing the colorants were very limited. To imitate the India patterns, European printers were content to apply mixtures of pigments in drying oils or varnishes. A simple drying was all that was necessary to fix them. Soon, however, the growing industry learned to apply the methods used by the dyers. The formulas used in the Orient were put into practice in Holland and Switzerland, and in Rouen, Mulhouse and Augsburg. Metallic mordants were printed on the fiber which had been previously treated with oils. The fabrics were subsequently dyed with such dyes as would yield colors with the mordants and which would be fixed by them, such as madder. In this way the reds, pinks, lilacs and purples were printed. Blues were obtained by means of indigo, prereduced with arsenious sulfide, applied with brush or block, then reoxidized in the air. Later, bright shades of blue were printed by applying indigo in a paste with ferrous sulfate, after which the cloth was given a treatment in strong alkali, thus reducing the indigo on the cloth. Then the prints were oxidized in air. This produced the famous "bleu faience".

Towards the end of the 18th century, the palette of colors was enriched by the introduction of yellows and olive greens by means of Persian berries and quercitron, which were fixed with aluminum or iron mordants. By combining, or by successive baths of weld and madder, oranges, browns and rust were possible. Green was made by combining the yellows

A



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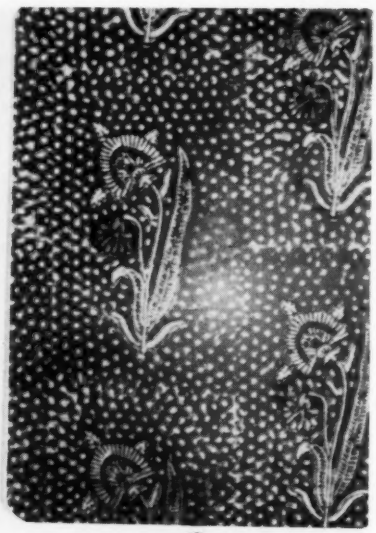

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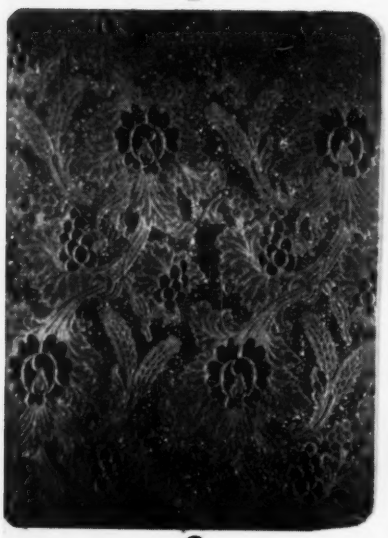

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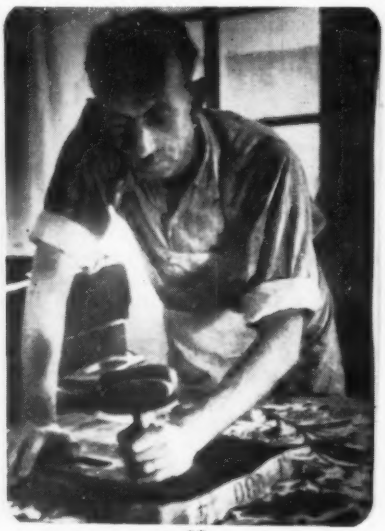

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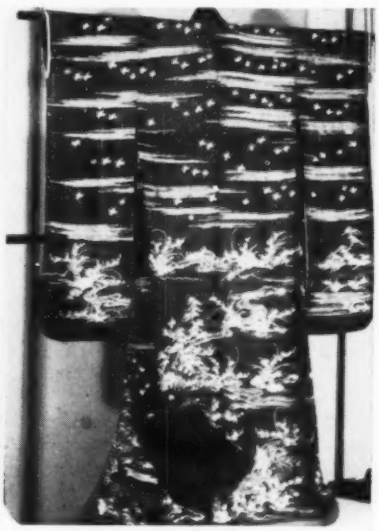

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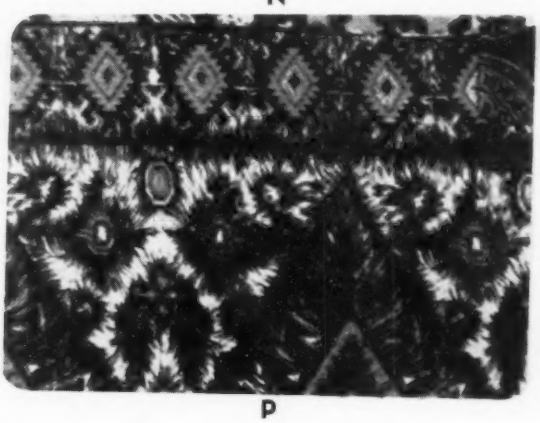

P

(Photos courtesy of Metropolitan Museum of Art and Cooper Union Museum)

A—Javanese batik
B—Javanese batik
C—Printed linen, Persia, 18th century
D—Printed cotton, India, 17th Century
E—Metallic silver print, Germany, 13-14th century
F—Printed cotton cloth
G—Hand-printed brocade, Russia, 18th century
H—Printed cloth, Munster, France, circa 1798
I—English curtain, pattern with signature
J—Printed cloth, France, 18th century
K—Alsatian block printer
L—Resist-dyed furisode, Japan, early 18th century
M—Painted linen mummy cloth, Egypt, 18th dynasty
N—Printed cloth, India, 15-16th century
O—Javanese batik
P—Javanese batik

with indigo.

Improvements were made in the wooden blocks used for printing. It was found that sharper prints could be made, if, instead of engraving in wood, brass sheets and wire were driven into the wooden forms. Later brass plates were cast and tacked onto the wooden blocks, with small curled nails to show the printer exactly where to set it down on the cloth for each repeat.

We can mention the successful printing from lithographic stone by the Hausman Brothers in Kolmar, who used this method to produce beautifully fine prints on silk.

Toward the end of the 18th Century there were the first attempts at printing from engraved copper plates. Patents are dated 1766 and 1767. The copper plates were etched with the pattern to be printed, but application in the manner of the wood block, ie by tapping with a mallet, did not suffice to produce a clear impression. So a copperplate printing machine was constructed, imitating a plate printing press. This was a slow and difficult process, but was used in many shops in England and on the continent.

Ombré or fondu, a method of producing multi-colored effects wherein the colors melt gradually into one another, was a variant form of block printing. The process is also called rainbowing, and prints designated as irised. The sieve which is used to supply color paste is prepared in a special way. A color lifter deposits various color pastes in little pools across the sieve, then they are spread with a horizontal roller producing a rainbow effect, which is in turn transferred to the cloth by blocks.

Blurred or nacré prints were the fashion at one time, requiring only that the cloth be damp when the color pastes were applied. In this way the outlines of the prints become blurred by seepage of the color and create a soft effect. This same soft effect is achieved by printing the parallel warps of a fabric before the filling threads are woven in, a style which is still much in vogue for neckties and scarves.

A method of producing white patterns on a dyed ground was instituted by the Monteith Company. This style, which assumed considerable proportions, consisted of discharging madder or alizarine red dyeings with chlorine, thus making a pattern of white dots on a red ground. The chlorine was pumped through a hollow roller, which was cut with holes. The style was produced on heavy flannel.

The earliest description of a roller printing machine dates from 1743 in a patent issued to Keen and Platt. The rollers were nothing more than an engraved plate bent around a mandril, the ends being joined by soldering, brazing or riveting. Since no doctor blade was mentioned, the color furnishing roller must of necessity have inked only the high portions of the engraving, so that it printed only in relief. In 1772 Atkin patented a single color printing machine, also in relief. In 1780 Bonvalet, a cloth printer of Amiens, constructed a machine which was turned by hand, consisting of a wooden cylinder and a hollow iron roller with an engraved copper surface. Between 1790 and 1800 relief roller print machines were set up, notably by Depouilly in France and Ebinger in England. Burch introduced the art of coppering the rollers, and of a continuous color-furnishing blanket.

The high point of the printers' art came with the invention of the engraved roller print machine. In 1783 a patent was issued to Thomas Bell, a Scotsman. His patent mentions color doctors, these blades being not only the means of furnishing color to the rollers, as we sometimes do today to make a sample strike-off, but also to clean the color from the unengraved portions. The next year he obtained another patent for iron mandrils and hollow copper shells, and in 1785 he had a machine set up in the shop of Livesey, Hargreave, Hall & Co. At first, the proper setting of the doctor blade was accomplished with considerable difficulty. The doctor blade is the most important part of the print machine, and accordingly Bell, as the inventor of the blade, deserves credit for the invention of the machine.

It was not until 1801 that Oberkampf and Lefêvre constructed print machines in France.

In 1823 Church took out a patent for molded copper rollers, and in 1836 Preston added the improvement of a back greige. New patents followed quickly, and new methods of engraving the rollers were found. Color troughs were invented with idling furnisher rollers. The duplex machine was invented which printed the back and face of the fabric simultaneously. There could be no doubt that, with the introduction of the roller print machine, printing with blocks would soon be relegated to the background. The great print works, which relied solely on block printing, changed almost entirely to the new roller-print machines.

Not all the calico-print shops changed over to the engraved rollers of the Bell print machine. Some preferred the relief-print machines, and some even built combination machines to print with both types at once. This combination print was the contribution of Burton in Robert Peel's plant. Machines for peg or surface printing are still in use in some localities for cheap flannels and cretonnes.

These large machines required tremendous power to drive them. It is no coincidence that it was just at this time that steam power was made available for driving the heavy machinery, so that larger and larger machines with many rollers could be harnessed and driven with the concentrated horsepower.

Every once in a while someone claims he has perfected a method for striping, that is, printing warpwise stripes of different colors without overlapping or skimpy fit. The original idea is very old, older than the records show. A patent was issued in 1834 to Bush, and improvements noted in 1857 and 1861, but to this day it remains an imperfect art, at best.

There is much talk these days about a stencil roller-print machine, supposedly a new twist. There is a patent dated 1790 issued to one Nicholson, describing just such a machine, consisting of a roller of thin metal through which the pattern is cut, while the color is applied from the inside of the roller, and forced through the openings with a brush.

In Rouens, in 1834, Perrot constructed a machine which automatically printed three relief engraved plates against the cloth in three contrasting colors. This machine was known as the Perrotine, and its use continued down to the early years of the 20th Century. In its time it was considered the most modern and forward advance.

By now the industrial revolution was in full swing. Much information on the technique of dyeing and printing of the early nineteenth century is contained in the "Magazine for the Art of Dyeing and Printing" which was founded and written by Dr Wilhelm Heinrich von Kurrer. In 1844 he published "A Story of Textile Printing." His history was written in a period of new and wonderful developments which were taking place in the art of printing.

In his book he tabulates all the print shops of Europe and America, and lists the number of print tables,

(concluded on page P180)

New York Section———

FAR-INFRARED FOR TEXTILE FINISHING*

W L THOMSON
Manager, Radiant Heater Div
The Edwin L Wiegand Company
Pittsburgh, Pa.

INTRODUCTION

BEFORE discussing electric far-infrared uses for textile finishing, I would like to tell you something, which, I am sure, is of interest to everyone, whether in the textile finishing business or not; something of general interest, about the increasing use of electricity in United States industry of today.

In 1947, use of electricity was about 5 kilowatt hours per man-hour of labor. Today, 10 kilowatt hours per man-hour are used. Since one horsepower is equal to 746 watts, or three-quarters of a kilowatt, each industry employee now has helping him about 13 horsepower in electrical equivalent.

Now, a large, well-trained man can deliver one-eighth horsepower but only for short periods of time; so, if men were used to replace this 13 electrical horsepower, it would require at least 106 men working at maximum effort to deliver only intermittently the power which is being supplied per man-hour by the American electrical industry today.

At current average industrial electric power rates, less than 2½ cents per kilowatt hour, the electrical equivalent of 106 man-hours can be had continuously, three shifts a day and seven days a week for under 25 cents per hour or about $.0024 per equivalent electrical man-hour.

This low cost bears no taxes or fringe benefits. The power it represents is available day in and day out and is one of the predominant reasons for our industrial and economic success.

It is predicted that our overall use of electric power will more than double each 10 years and at decreasing relative costs.

In order to assist people in industry to better realize the values to be obtained by increased use of electricity, the Industrial Electrification Council was recently formed, choosing as its first mission to industry the formulation of an educational course in the uses and applications of metal sheath electric heaters to a wide variety of industrial process problems. The Metal Sheath Heater Course has now been given by 32 electric utilities to more than 6,000 industrial power user personnel; plant engineers, process engineers, maintenance men and others interested in process and comfort heating problems in their various industries.

To show how important this can be to you, it is interesting that one utility has given the course six times in the same area. For the first session, the class consisted of 30 people. Each session grew progressively larger until at the sixth session 82 people showed up, most of them from plants that had already sent others of their personnel to take the course. So, if your local utility company has not as yet offered the course in Metal Sheath Heaters sponsored by Edison Electric Institute, ask your electric utility power salesman when the course will be given. It will do wonderful things for your business in promoting economy, automation and above all, profit.

FAR-INFRARED RADIANT HEATING

Radiant heating is probably as misunderstood as any subject could be, for the simple reason that people usually attack it with what is sometimes called "the concrete mind"—one which is thoroughly mixed up and permanently set.

Actually, radiant heating principles are very simple and its uses date back to the time of the ancients who used it to evaporate water for making salt, for drying fish, etc. There is no reason today why we could not continue to use solar radiation in industry except that it is not continuously available as at night or on rainy days and is not easily subject to control.

Radiation cannot be stored as such, so, of necessity, if radiation is to be useful in industry a source must be found which is available where needed, economical to apply and use, and subject to easy control in a wide variety of industrial processes. Very largely, radiant heating in industry is dependent upon electric power as a source, and fortunately this is now almost universally available.

The reason radiation is valuable, and this applies to all kinds of radiation, is because it travels from source to the point at which it works with the speed of light. It also travels through most gases without any loss, and for that reason all of the radiation which is accepted by a given piece of work is turned into heat, that which is rejected or reflected can be returned to the work with a reflector.

Radiation which is industrially valuable for heating purposes comes from the infrared wave lengths of the spectrum. This infrared portion of the spectrum is customarily divided into two portions, "near-infrared" with wave lengths up to 0.7 micron and far-infrared with wave lengths ranging from 0.7 micron to 1,000 microns. Near-infrared comes from high temperature sources, such as the glass-enclosed infrared bulbs used by Ford Motor Company 20 years ago for paint drying.

Far-infrared comes from lower temperature sources, such as metal sheath heaters, and this radiation is characterized by the interesting quality of "color blindness." This means that all colors from black to white "see" far-infrared radiation as varying shades of gray, and, therefore, work materials of all colors can be heated at practically the same speed. This can be very important in any business where wide variety of colors must be handled.

Another advantage of far-infrared is that, because it comes from low temperature radiant sources, these sources cannot be a source of undesirable glare.

In industrial fields the metal sheath heater as a source of far-infrared

* Presented before the New York Section on April 27, 1956 at Kohler's Swiss Chalet, Rochelle Park, NJ

can take many forms and has many advantages. Being encased in a metal sheath, all electrical parts are enclosed for safety and long life. The device is splashproof and shockproof and is easily subject to control. The metal sheath heater can be made in a variety of volt and watt ratings, and radiation from it can be spread out over the widest widths with perfect uniformity.

Uniformity becomes highly important in such operations as resin finishing where maximum cure without degradation is essential to maximum user satisfaction with minimum use of resin all perfectly cured.

Numerous requests make it seem desirable that the subject of resin finishing be reduced to more of a science than at present.

Several years ago investigations were started in the use of far-infrared metal sheath heaters for curing paper-resin combinations. To date many interesting and valuable results have been obtained on a laboratory basis. Since the paper and textile industries are not entirely unlike in that they both deal with fibrous materials, it is felt that some contribution could be made in the resin finishing field if a comprehensive program of development could be evolved. Results of our investigation in the paper industry are gladly made available to all who are interested.

Far-infrared can be valuable in prevention of migration of dyes and resins which result from liquid flow from one place to another in fibrous materials.

Migration will invariably be caused by lack of symmetry in any of the forces which may cause liquid flow. Among these forces are gravity and evaporation. Counteracting evaporation from one side of a piece of goods by inducing evaporation from the other may be a means by which

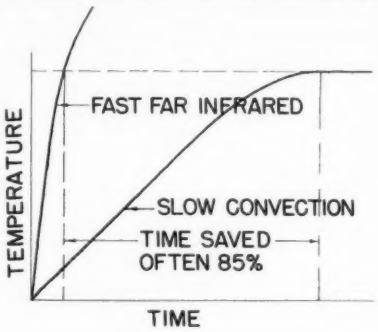

Figure 1

equality of liquid flow is restored. In general, it seems that the application of far-infrared to the side of goods toward which migration is desired has a corrective influence. Here again is another of the many problems which needs evaluation from a laboratory standpoint.

In order to give you a better idea of what equipment is available, how it is applied and how it works and why, here are a number of illustrations.

Figure 1 illustrates the fast heating quality of far-infrared as compared with slow convection. The frequent time saving of 85 percent is due to the fact that infrared penetrates the boundary film of air which surrounds and adheres to the surface of each fiber in a piece of goods, yarn or thread. Traveling with the speed of light, radiation penetrates the boundary film and causes fast heating of the fiber without the necessity of heating the air around it. This mechanism is the universal attribute of far-infrared and accounts for its popularity in the many industries where it is used.

In Figure 2 is shown the type RAD radiant heater consisting of a metal sheath electric heating element mounted in an aluminum extrusion bearing a parabolic polished aluminum reflector. This is one of the earliest forms of metal sheath far-infrared heating devices built and although it has been supplemented by others, it is the device used in heating on tenter frames because it can be rotated in the event of work stoppage and as supplemental heat in hot flue dryers where high ambient temperatures do not affect its all metal construction. Available in a wide variety of lengths, volt and watt ratings, the type RAD radiant heater is adaptable to a wide variety of high- and low-intensity heating applications.

In Figure 3 is shown the type RP radiant panel designed to furnish high intensity far-infrared over large areas. Use of this construction minimizes electrical and mechanical connections to be made when covering large areas with radiation. Composed of metal sheath heaters mounted on an insulated frame with reflector and bus bar connections, this construction represents the ultimate in economy and ease of application where areas of radiation are needed.

In Figure 4 is shown the type U-RAD radiant heater, an adaptation of the construction shown in Figure 2, and designed to give variable areas of high-intensity radiation. Each of the two elements shown is available in a variety of physical lengths, volt and watt ratings, and combinations of any two of six different physical lengths may be combined in the extruded aluminum housing to produce twenty-seven different heated lengths. They may be used singly or in pairs as shown. This device has very considerable economic value where webs of different widths must be handled at different times. Extreme economy in the use of wattage is thus made available for preheating, drying and resin finishing.

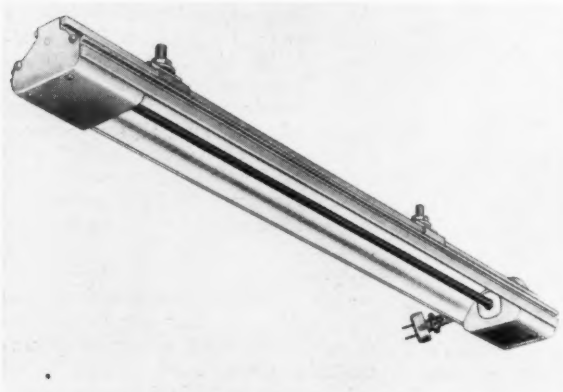

Figure 2

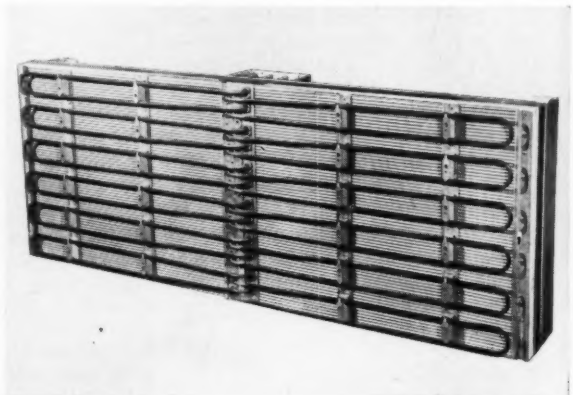

Figure 3

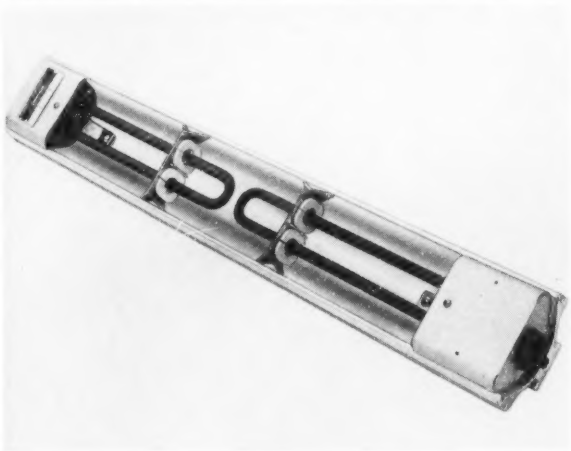

Figure 4

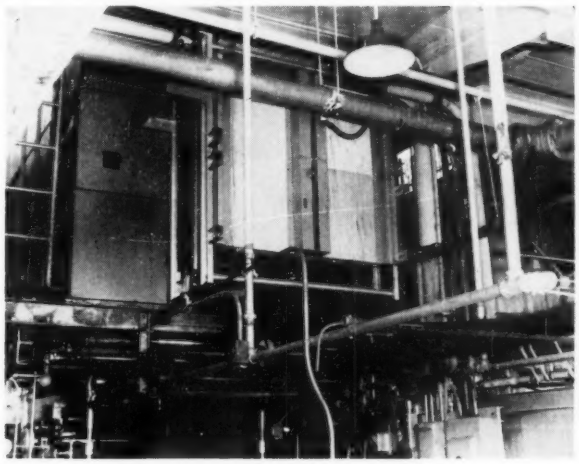

Figure 6

In Figure 5 is shown one of the seven models of the style FR glass lamp replacement element designed tc replace glass lamps of 375-watt to 1200-watt rating. This device has very material value in the textile industry since it is not only glareless but also splashproof and shockproof and delivers radiant energy in a broad, flat heat pattern. Models are available for practically all existing glass lamp replacement purposes.

Figure 5

In Figure 6 is shown a group of four type RP radiant panels placed face to face ahead of a loop dryer with initial evaporating capacity of 900 pounds of water per hour. In an effort to increase the capacity of this dryer by 25 percent, it was decided to preheat the goods before they enter the dryer by use of radiant panels with installed capacity of 86.4 kilowatts. The drying capacity was actually increased from 900 pounds per hour to 1284 pounds per hour or an increase of 42.7 percent with an economy of 0.225 kilowatt hours per pound of water of increased drying capacity.

Although usually used on an enclosed tenter, type RAD radiant heaters are shown in Figure 7 on an open tenter. These heaters are rotatably mounted so that radiation can be turned off the work in the event of stoppage. Complete information as thus far determined on resin finishing is available in "The Textile Report" on request. In Figure 8 the heaters are shown rotated off the work with the tenter stopped.

In Figure 9 is shown the operating view of a preboarding machine powered with type RAD radiant heaters and having a capacity of 305 dozen pair of socks per 8 hour shift. Figure 10 shows this machine in the open (for maintenance) position. A similar steam-operated device has a production capacity of 230 dozen pairs per 8-hour shift. Operating cost of the steam machine is 7 cents per dozen and of the electric machine 5 cents per dozen showing a saving of 28 percent in operating cost for the electrically operated device. Initial cost of the steam machine is $5000.00 against the electrical machine at

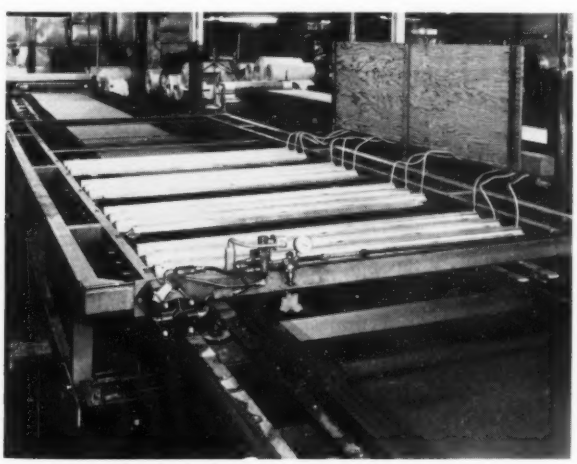

Figure 7

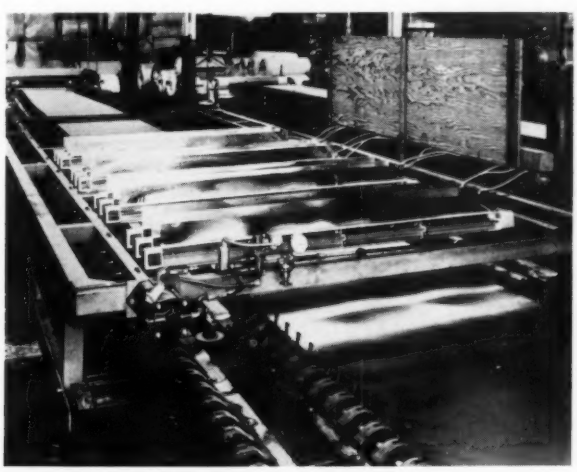

Figure 8

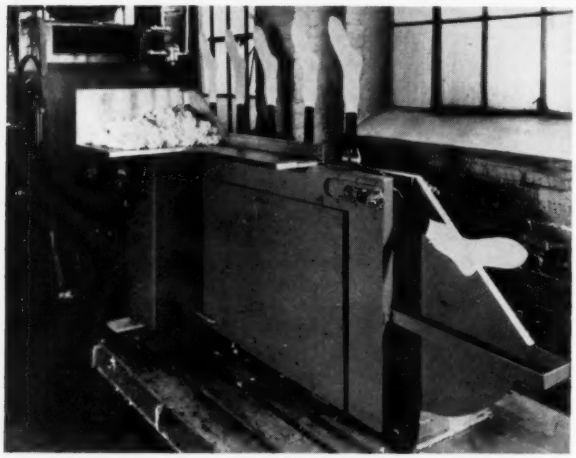

Figure 9

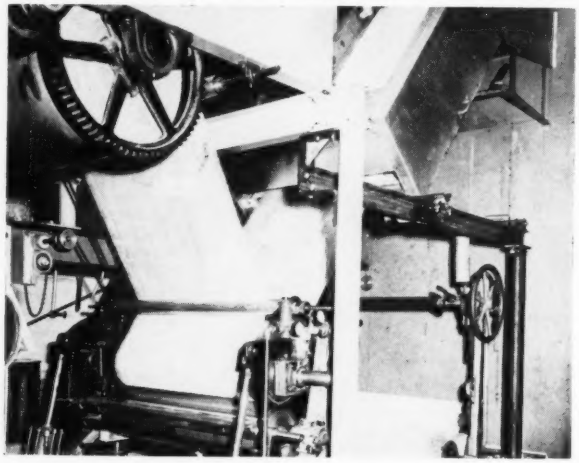

Figure 11

$3200.00. The installation cost of the electrically operated machine is considerably less than that of the steam machine since no boiler capacity is required. Furthermore, the electrical machine may be operated at any time regardless of availability of steam supply. Electric capacity is 12.8 kilowatts in type RAD radiant heaters and the time of exposure in the heated zone is 6-8 seconds.

In Figure 11 a thin web of cotton linters is being roll printed with polyvinyl chloride. Prohibitive cost and space requirement for steam drying equipment dictated the use of type RP radiant panels mounted above the web after the printer as shown in Figure 12. Drying time is 2 seconds at a power cost of less than one tenth of the acceptable power cost of $.003 per square yard.

Wide interest in industry as to the economy and efficacy of straight water evaporation by far-infrared has led to extended investigation at a leading university. In Figure 13, cost of steam evaporation is compared with that of electric evaporation using type RAD radiant heaters. From the curves it is seen that, at a steam cost of 75 cents per thousand pounds, an evaporating rate of 2.5 pounds of steam per pound of evaporation would give an evaporating cost of .18¢ per pound of evaporation. The same cost would be shown by an economy of .250 kilowatts per pound of evaporation and a power rate of .75 cents per kilowatt hour.

The indicated economy of 0.250 kilowatts per pound of evaporation is not at all unrealistic since the test work leading to this figure was performed at room temperature whereas goods entering a radiant dryer will be preheated somewhat by previous operations. It is believed that interesting economy will be demonstrated if all of the realistic costs of steam operation are taken into consideration before comparisons are made.

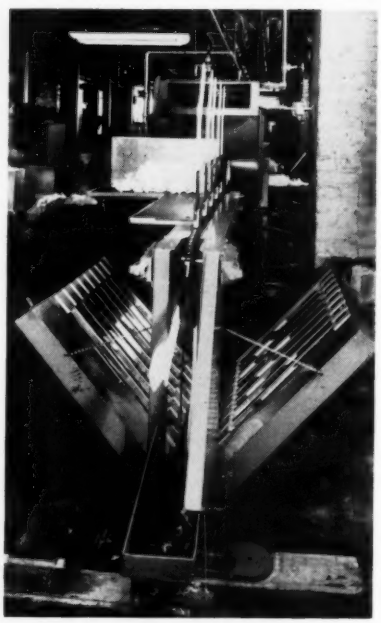

Figure 10

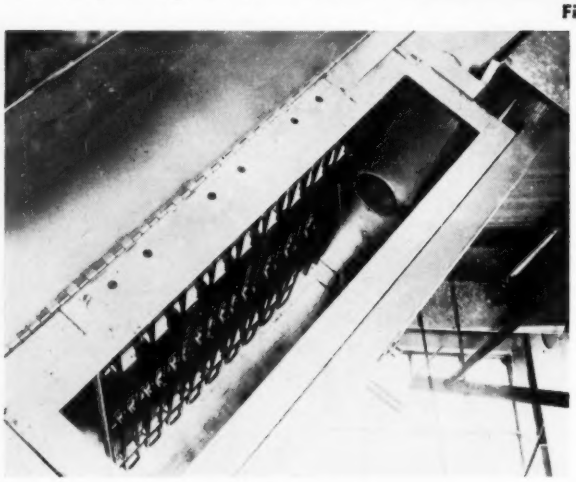

Figure 12

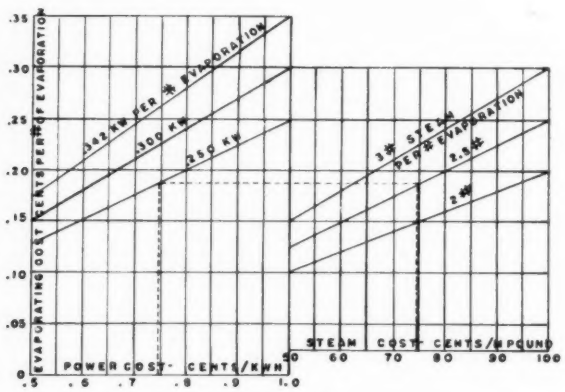

Figure 13

Cost of water evaporation from textile webs. Chromalox radiant heaters vs steam

QUESTIONS AND ANSWERS

Question: Is it possible that the element itself loses efficiency after a certain length of time? In other words, does it drop in efficiency?

Answer: Actually it is found from practice that the metal sheath radiant heater will draw the same wattage from the day it is first connected until it is no longer usable. The filament of a lamp tends to evaporate and the wattage slowly goes down.

Q: In other words, there is no deterioration in the element itself?

A: Not until, all of a sudden, its normal life has been expended. It's one of the peculiar things about the business. The drop in wattage, in a normally made and normally used metal sheath heater is practically negligible over the whole life of the heater, and, of course, wave length is determined by the temperature of the source.

Within a typical 10,000-hour life, the resistance will stay within 5 percent of the original resistance, so, therefore, the wattage output is the same and the temperature on the sheath does not vary. The wave length stays substantially constant. A metal sheath heater of any type, not just the type here, burns out by straight open circuit or short circuit. It does not gradually deteriorate.

Q: Attention has been drawn to the fact that other sheaths are more efficient for some of these types of heaters, other than metal. Ceramics is an example. Is there any engineering basis to this?

A: Well, to answer your question, and to try to do it so no one is further misled, the difference between the radiant ability of any source as against any other source is a characteristic of the surface known as its emissivity. A surface which is largely nonemittive will not radiate well and its temperature must rise. The rise will continue until the wattage input is entirely dissipated by radiation, convection and conduction. If a surface is highly emissive, it means it will radiate well and operate at a low temperature. Frankly, emissivity is one of the things that enters our art but very little for the very reason that emissivity is so high that there is very little chance of improving it by a choice of other materials.

Choice of sheath material is largely a function of ability to withstand temperature and as far as a ceramic is concerned, it might have great disadvantage in terms of strength, shock resistance and adaptability to being given a variety of shapes.

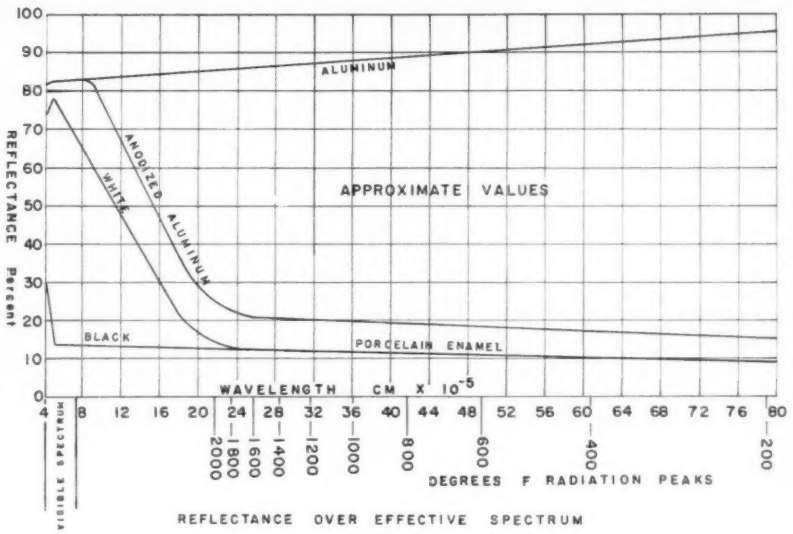

Figure 14

Q: In most of the pictures applying to electrical heaters that you have shown, the heaters were on the upper and lower surfaces. Where you have a condition with heaters on the upper surface? What materials do you recommend to do the best job with regard to reflectance of the radiation?

A: We have found from practice that anything which is coated with aluminum or made of aluminum is an excellent far-infrared reflector. In the early days we didn't know too much about the business of reflectivity, and we equipped our radiant heaters with a nice, bright aluminum reflector. The brightness hasn't a thing to do with it, as a matter of fact, because we now furnish dull aluminum-coated steel as reflectors. In large operations where you need the strength of steel and the reflectivity of aluminum, this combination gives an admirable result.

The aluminum-coated steel now is only available in a very rough aluminum coating. It is absolutely nonreflective, as far as visible wavelengths are concerned, and yet it is as reflective as polished aluminum, meaning 90 percent or so, as far as far-infrared is concerned. You find as you get into this business that there are certain things which are very difficult to heat, and those are the things which are good reflectors.

If you are working with a piece of cloth which has a metallic thread of aluminum color, this thread will be hard to heat because it is a good reflector. There are ways to counteract this. For example, put the reflective metallic piece of goods into a box with some more reflectors around it. Bottle in the radiation, and if the work reflects the radiation, make it reject to a reflector, which bounces it back again.

Q: the reflectivity of anodized aluminum is only a fraction of that of metallic aluminum. Now, if a couple of molecules of aluminum oxide appear as a layer on a surface of aluminum, what happens to the reflectivity?

A: The normal and invisible layer of aluminum oxide which you find after finishing aluminum is apparently not reflective and is therefore penetrated by the radiation. If a thick coating of oxide is put on an aluminum reflector, then the coating becomes the reflector because the radiation will not see through it to the aluminum underneath. That is why on the curve (see Fig 14) it shows anodized (oxidized) aluminum as a poor reflector of far-infrared radiation. In other words, the radiation does not see through the anodized surface. That surface is the reflector and it is a poor one.

In all of these things great care is necessary to evaluate what goes on and to then determine the answer. I remember, as an example, when developing the foundry practice of shell molding, which is the art of putting resin in sand and then curing the resin in the sand to make a hard shell, a radiant heater with a nice shiny aluminum reflector in it was used. The reflector turned black in two or three cycles because of the fuming of the plastic resin binder.

We thought we would be unable to do the job but it turned out that the black coating on the reflector became a very good absorber, and because of this it got hot and became a radiator. So the reduction in radiating efficiency was practically nothing.

Minutes———

191st Meeting
TECHNICAL COMMITTEE ON RESEARCH

THE one hundred and ninety-first meeting of the Technical Committee on Research was held at the Hotel Statler, New York, NY, on Friday, January 18, 1957, with the following members present:

C A Sylvester, *chairman;* M J Babey, *vice chairman;* H W Stiegler, *director of research;* C W Dorn, *chairman, Executive Committee on Research;* J A Woodruff, *secretary;* G O Linberg, *president, AATCC;* W D Appel, T F Cooke, W E Coughlin, R E Derby, H A DesMarais, A W Etchells, P J Fynn, R C Geering, H E Hager, W G Helmus, W A Holst, A E Johnson, E R Kaswell, A J Kellner, J V Killheffer, W Klaas, L S Little, J E Lynn, J E Meili, J E Norton, B R Norwick, G P Paine, F J Rizzo, R E Rupp, C H A Schmitt, G M Smith, R B Smith, R H Souther, F H Stieger, A R Wachter, R L Wayland, G W Wernz, G S Wham, M Winkler, P J Wood, and C L Zimmerman.

After Chairman Sylvester opened the meeting, President Linberg addressed the members and offered his thanks to those who have contributed and will continue to contribute their time and ability to the various research committees.

EXECUTIVE COMMITTEE ON RESEARCH———Charles W Dorn, chairman, reported that a meeting of this committee was held on January 17, 1957 at which the following decisions were reached:

a) The next meeting of ECR would be held at Roanoke, Virginia, on Friday, March 29th at 9 AM.

b) Charles A Sylvester was nominated chairman of TCR for 1957.

c) Appointments to ECR membership should consist of two members from the South, two from the Central Atlantic region, one from New England and one from the West.

d) The appointment to ECR of Joseph H Jones and V B Holland would be recommended to the Council.

e) The question of whether or not AATCC should accept an invitation from the U S Department of Commerce to exhibit the Flammability Tester in the main lobby of the Department of Commerce building together with exhibits from organizations sponsoring standards was tabled pending further investigation.

f) The recommendation of the national Research Advisory Comittee, that this special ECR subcommittee be disbanded, having completed its job, was accepted.

g) At the request of TCR, Richard F Aurich, Joseph Bancroft & Sons Company, was appointed the new chairman of the Committee on Damage Caused by Retained Chlorine. The request of this committee for an appropriation of $1,000 to cover the cost of purchasing and finishing 3,000 yards of material plus smaller yardages of colored fabrics was approved as was its request to initiate a project at the national headquarters.

h) ECR went on record in affirming as its continuing policy, for the guidance of TCR, that the chairmen of TCR subcommittees, subject to the approval of ECR, may limit the number of members of their respective committees, and also that meetings of such TCR subcommittees would be considered as restricted to members and invited participants unless such meetings were declared "open meetings" by the chairman, subject to approval by ECR.

i) Approval was voted to replace present AATCC methods of fiber identification with those of ASTM in the next *Year Book.*

j) John V Killheffer was approved as chairman of the committee to investigate a new method of evaluating evenness of package dyeing developed by Kenneth L Dorman, Franklin Process Companies, and offered to AATCC.

k) At the request of the Standard Soils Committee, the scope of the committee work has been defined as being relative to "Soils to be removed by textile mills (sizes, natural fiber impurities, etc)."

l) ECR would recommend that the Inter-Society Relations Committee appoint an observer to attend a meeting of a National Committee on Surface-Active Agents being formed by Emery I Valko, Onyx Oil and Chemical Company.

m) With regard to the proposals by the Piedmont Section for the investigation of radio-active methods in textiles, it was agreed that, should the Piedmont Section contribute $500, ECR would ask the Council to approve an expenditure of $2,000 toward the preliminary investigation. No action would be taken at the present time.

n) The recommendation of the Committee on Constitution and Bylaws that the last paragraph of Section 2, Article IV of the Bylaws be changed to read—"The Committee shall be responsible for the general research policy and program of the Association and for the technical organization and supervision of the research program"—was approved.

o) The following appointments to TCR were approved: V B Holland, Cannon Mills; Joseph H Jones, Phoenix Dye Works and Charles L Zimmerman, Dan River Mills, Inc.

p) The proposed infra-red heating project was tabled, since it did not appear feasible to take any other action at this time.

q) It was recommended that, at the Roanoke meeting, TCR hold its Committee meetings on Friday and Saturday, March 29th and 30th; that its regular luncheon be scheduled for Saturday; and that, in place of its regular technical session, it take over the second half of the Piedmont Section's afternoon session and have chairmen of selected committees of special interest to the South give reports on the activities of their respective committees.

r) It had been reported that two lots of AATCC multifiber test fabric varied in pH from 7.0 to 9.4 and did not produce comparable staining when subjected to a special test not sponsored nor developed by AATCC. It was the unanimous opinion of ECR that AATCC should take no action in the case nor should it consider itself in any way liable. It was the considered opinion of ECR that it was not practical for AATCC to undertake any further standardization of its test fabrics beyond present specifications. Approval was voted to publish the

present specifications in the *Year Book*.

ECR was advised that the Light Fastness Standards Committee has prepared a preliminary draft of a proposed daylight test for submission to the ISO. The Committee also plans to submit a carbon arc test.

Dr Stiegler reported that the staff at the Lowell laboratories was doing work for the following Committees: Abrasion, Dimensional Changes, Flammability and Wash Fastness.

COMMITTEE ON EVALUATION OF CREASING PROPERTIES OF FABRICS———E R Kaswell reported briefly. A report on the Celanese tester will be given at the next meeting as well as the results of the use of the 1.5-pound weight and the 500-gram weight with the Monsanto tester.

COMMITTEE ON COLORFASTNESS TO PLEATING———J E Meili reported that the current method is all right for the old-type fibers but not satisfactory for the new thermoplastic fibers.

The methods of pleating in use today were reviewed. The opinion was that three tests should be offered for use:

#1-without pressure — maximum time 20 minutes,
#2-with 10 pounds pressure,
#3-with 20 pounds pressure.

These would be tests for the dyers, not for consumers, to see if bleeding would occur during these exposures. A pressure cooker could be used for the work.

COMMITTEE ON BLEACHING ———G M Gantz reported as follows:

A regularly scheduled meeting of the Committee was held at the Hotel Statler on January 17th with five members present.

In the absence of T Bell, there was no report on the combined test procedure for noncotton content of fabrics.

No word had been received from Lowell as to balloting on the methods of analysis for hydrogen peroxide in bleach baths.

No additional data was presented on the two capillary rise absorbency tests under study. Mr Holland reported on an absorbency test used in his laboratory which has proved very satisfactory for toweling and which is nondestructive.

The chairman reported on ECR reaction to the Committee's proposal that efforts be made to find a graduate student to study the Cuam and Cuen fluidity test methods.

Also reported was a visit with Dr Carl Conrad at SRRL in New Orleans.

The Committee will be kept advised of the work of the Joint TAPPI-ACS-ASTM Committee on Disperse Viscosity of Cellulose.

The latest modification of Hunter's Model D-18 reflectometer was discussed. This instrument now costs $765. It measures both reflectance and yellowness, contains a scrambler to eliminate texture effects, and has a U V filter to permit evaluation of optical bleaches. If one or more members of the Committee are able to purchase this instrument it will be studied carefully for application to whiteness determination of bleached fabrics.

Although several members of the Committee indicated they would not be able to attend a meeting in Roanoke, Va, on March 28, still it was decided to hold one since at least five members plan to attend.

END USE COMMITTEE———P J Fynn reported in the absence of J Labarthe, that the Committee had not had any meetings.

COMMITTEE ON LIGHTFASTNESS———J E Norton reported as follows:

The Lightfastness Committee met at 1:00 PM Thursday, January 17, 1957 with 18 members and guests present.

Comments received on the proposed ISO Method "Color Fastness to Light: Daylight (Alternate USA Method)" were read and discussed. It was agreed to change the title to "Proposed Tentative Method: Color Fastness to Light: Daylight (USA Method)." The revised method will be sent out with a letter ballot to all Committee members requesting approval for submission to ISO and for its adoption by the AATCC as a tentative method to replace our present sunlight test method.

C H A Schmitt, chairman of the Special Task Group, reported on the status of the work of his group. Repeat runs from August to October of 1956 at four locations confirmed previous conclusions from the work done last March and April to the effect that, when exposed to the same total amount of radiation, there is good reproducibility regardless of the method and the exposure location employed. It is believed, however, that the group should have the benefit of twelve consecutive months of testing at different locations before incorporating the Langley method into the AATCC Test Method.

The work of this committee has indicated that, while the sunlight method, between 9 and 3, is more reproducible, a daylight method in which the samples are left in the cabinet uncovered 24 hours per day is a more practical and realistic test since it materially reduces the time of the test and provides conditions of exposure more nearly like those encountered in actual end use. This the basis for the Committee's adopting a daylight test to replace the present sunlight test. It should be emphasized that the proposed daylight test employs the AATCC Blue Wool Lightfastness Standards as the basis for evaluation of lightfastness. If subsequent work of the committee substantiates the present information, exposures on the basis of Langley units will be proposed for incorporation into the method.

Because of the great interest in this subject, the Committee plans shortly to have published Section I of a report to cover its work and findings to date. In this, some of its conclusions will be specific whereas its conclusions and recommendations on the proposed Langley method will only be tentative. Section II, which, it is hoped, will be published later, will be a simple confirmation and official recommendation.

Work at Salem by AATCC Research Associate Charles Seibert, is progressing towards completion of the evaluation of all his work and the preparations of reports for publication.

Because of the overlapping interests, the Light and Weathering Committees were scheduled for consecutive meeting periods in the same room, and members of each were invited to sit in on both meetings. It was agreed that accelerated weathering tests, as proposed by one of the large consumer groups as a method of evaluating lightfastness, more logically should be considered by the Weathering Committee. While the AATCC cannot dictate or object to a test any group or industry adopts, we do believe that, as a service to our membership, that information should be developed pointing out the good and bad points of any such test, and where practical, a test should be developed by the AATCC which will meet the needs of the textile industry. In considering an accelerated weathering test as a means of evaluating colorfastness of textiles, the Lightfastness Committee will cooperate closely with the Weathering Committee and turn over to it all data as well as a supply of the materials used by the Lightfastness Committee on its daylight test program.

COMMITTEE ON WEATHERING OF TEXTILES———F J Rizzo reported on the meeting of the Committee held on January 17th.

The Committee has approached the task given to it with the full realization that the eventual establishment of test procedures can come only after the resolution of many factors beyond those which influence lightfastness, such as the nature of the water, the light to spray cycles, temperature of the water, the metals in the water, etc. In addition, it recognizes that there are two basic areas of interest in weathering:

1) colorfastness
2) degradation.

It further recognizes that, in colorfastness, two separate requirements will exist:

1) correlation with the daylight test
2) a time exposure to all weather elements.

The situation arising out of the recent action of the G M Corporation in establishing a Weather-Ometer test for automotive fabrics is considered as constituting establishment of higher standards by that company, and the specific action of this committee shall be to establish an adequate test method which can be recommended by AATCC for use in connection with this or any other standard. The Committee's work is in too early a stage to recommend any procedure at this time.

For the colorfastness phase of this program, the Committee is undertaking to:

1) Evaluate the fading rate of various Weather-Ometers, as now existing, with the NBS papers by eliminating the water sprays, ie, use the machine as a Fade-Ometer.
2) Fade the Blue lightfastness standard in an effort to correlate results with both Fade-Ometer tests and the results of daylight rating based on Langley System as obtained by the Lightfastness Committee.
3) Determine whether the Blue standard can be use as reference standard for weathering fastness as well as for fading fastness when exposed under strictly weathering conditions; ie, with the light and water spray.
4) Expose fabrics from the series which the Lightfastness Committee has been using in the "Langley" Series.

The Committee has obtained one yard of the Blue standards for the director of research and will need four additional yards for the immediate program. Authority for these materials is required and has been requested.

For the "degradation" phase, it was agreed to use tapes of the type which the QMC has been using for this type of study as a means of calibrating equipment and as possible reference standards.

The Committee requested the approval of TCR for authority to proceed with negotiation for the purchase of such tapes with the same sources being used by the QMC at this time, so that correlation with exposure data obtained by the QMC can be effected. QMC has agreed to share such data.

It is anticipated that the Committee will, at an early date, require establishment of two panels: one concerned with colorfastness, another with degradation.

COMMITTEE ON FLAMMABILITY OF CLOTHING TEXTILES———R C Geering presented the report of this committee for the 1957 *Year Book*.

COMMITTEE ON COLORFASTNESS TO WASHING———R B Smith reported that the Committee had met the previous day, with the following subjects considered:

Industrial Laundering Tests

The Committee has examined the trouser legs that had been washed in two industrial laundries in the Detroit area and also the set laundered by Good Housekeeping Institute in typical household equipment. Another set laundered in the South are in the possession of R H Souther, who will forward them to Lowell.

Examination of the tests showed industrial laundering to be much more severe than home laundering.

George Mandikos was asked to start work at Lowell to duplicate the effect of five industrial launderings by a test to be made in the Launder-Ometer. He was also asked to tabulate gray scale ratings for all of the tests received from the laundries.

The Committee has suggested the following variations of the #3A test to be considered in the attempt to duplicate the effect produced by five industrial launderings:

1) Increased alkalinity
   a) by using caustic
   b) by using orthosilicates
2) Increased time
3) Increased temperature
4) Reduce soap concentration
5) Use of a nonionic, nonsudsing detergent
*6) Use of sand instead of steel balls.

*J E Norton will inform Mr Mandikos of the supplier of the special type of sand needed for this work.

Chairman's Annual Report

The chairman's report was unanimously approved as read.

Changes for 1957 Year Book

Subject to the approval of TCR, the Committee has unanimously recommended that the names of test methods 36-54 and 61-54 be changed to "Wash Test for Characterization of Textile Colorants" and "Colorfastness of Textiles to Commercial Laundering and to Domestic Washing—Accelerated Tests" respectively.

The Committee has also recommended that the second paragraph of Method 36-54, as it appears in the 1956 *Year Book*, be deleted.

Extension of "A" Series Test to Include Handwashing

Mr Smith discussed the need for a test to determine a degree of washability lower than that covered in the #2A test. This test should predict fabrics that would withstand hand washing and possibly wet methods of drycleaning. Mr Fynn exhibited three fabrics that failed the #2A test but were satisfactory to a #1 test or hand washing. He will attempt to obtain several yards of each fabric for committee use. Paul Stam offered to obtain several fabrics for the Committee to be used in this project.

COMMITTEE ON STREAM POLLUTION———R H Souther reported that considerable treatment experience had been reported and that progress had been apparent, particularly where the wastes were combined with sewage. Starch ethers have been found to be low in BOD and, being cheaper, were substituted for CMC.

It was voted to change the name of this committee from Stream Pollution to National Stream Sanitation Committee.

Through R B Smith, the Laundry Waste Guide has been published by the U S Department of Health.

COMMITTEE ON COLORFASTNESS TO DRYCLEANING———A E Johnson reported as follows:

"The Steering Committee of the Committee on Drycleaning Test Methods has had a number of meetings over a period of about a year and a half for the purpose of supervising certain research work largely carried forward by the National In-

stitute of Drycleaning, looking toward completion of a project to develop a new and improved method of testing textiles for drycleanability. This committee consists of A E Johnson and Robert Graham of National Institute of Drycleaning; Genevieve Smith of Sears, Roebuck and Company; George Blomquist, Interchemical Corporation; and Norman Gobiel, J P Stevens Company.

"The subcommittee held its most recent meeting on January 15th and came to agreement on the following new tests: Colorfastness to Drycleaning, Durability of Finish, and Applied Designs to Drycleaning. The scopes of these tests reflect the needs of industry for methods of evaluating textiles as to their probable behavior in commercial drycleaning procedures.

"It is of interest to note that no water is used in these tests as contrasted with Tentative Test 25-52. Also, both the glass jar and steel tube containers as used in washfastness tests in the Launder-Ometer are called for in the respective tests which, as far as colorfastness is concerned, seem to be interchangeable. This satisfies the somewhat different needs of dyestuff makers and retail laboratory or consumer testing requirements. It is also of interest that no stain swatch is needed as staining is not a problem in drycleaning.

"The effect of abrasive action on finishes is best reflected in the test for Durablity of Finish and Applied Designs to Drycleaning in which 100 steel balls are used. Perchlorethylene is used in bath tests as this solvent is the more severe of the two basic solvents employed in the drycleaning industry. In the tube test, an alternate cycle of Stoddard Solvent is required as it has been reported that some finishes are more affected by this solvent than by perchlorethylene. The Committee has found that color evaluations are adequately determined in the glass jar test which uses only 20 steel balls.

"These tests will be submitted to the whole committee after some interlaboratory checks have been made. It is hoped that the Technical Committee on Research can clear the way for a letter ballot vote on these tests before the Roanoke meeting in March and in time for inclusion in the 1957 *Year Book*."

RESEARCH LABORATORIES—AATCC———H W Stiegler reported as follows:

Abrasion—Accelerotor

There are over 70 Accelerotors in use including those in foreign countries: Switzerland, Netherlands, Canada, Israel, Japan, Germany and Denmark. Testing with abrasive liners has been developed to permit mild and harsh treatment, exclusive of the size of grit used on the liners, by placing a layer of sponge or foam rubber under the abrasive liner. The abrasive liner "gives" with the blow and less damage is done to the specimen. For more rugged abrasion testing the liners are mounted without the sponge-rubber liner.

No-grit testing has been improved by examining a series of sponge- and foam-rubber compositions for characteristics that would produce satisfactory weight loss in a few minutes. This also permits the liner to stand up for a great many tests without being torn or worn on the surface. These liners may be cleaned by light scrubbing or washing.

An inter-laboratory test has been set up. Seven laboratories will participate in a program statistically arranged for maximum information regarding reproducibility, liner performance, testing with controlled and uncontrolled speeds and with grit and no-grit liners. The fabrics to be tested include:

1) Three grades of cotton twills of work-clothes, one containing Dacron.
2) Medium grade sheeting in four finishes; control, mercerized, resinated and mercerized-resinated.
3) Rayon, control and resinated.

Later the Committee will be asked to consider development of the most realistic and satisfactory test methods for the various categories of textile materials and their end-use requirements. Alternate wash and dry wear testing will be established.

Dimensional Changes

Work has continued on the possible application of the AATCC Dynamic Dimensional Change Meter (for changes taking place during humidity changes or during wetting and drying of the statically held specimen) and the Accelerotor (for the effects of mechanical action, compression, stretch and tumbling). It is hoped that these two conditions may furnish useful information for the study of fabric changes under static conditions and mechanical action as in laundering.

Restorability curves have been determined on some fabrics in a program to determine optimum stress to apply in restorability testing for specific types of fabrics.

Flammability

The Flammability Committee has been very active and has held frequent meetings. Very close cooperation between our laboratories and the Committee has been maintained. Brushing of the specimens has been further investigated as well as the use of cardboard specimen holders.

The sections of the flammability test covering drycleaning and laundering have been investigated. Steel containers were used for this purpose in the Launder-Ometer.

Laundering

The commercial laundering of simulated pant legs made of vat-dyed cotton twill was continued. Thirty-six were sent to four cooperating laundries for 5, 10 and 20 launderings. Launder-Ometer tests will be made and the fabrics will also be subjected to the Accelerotor for rapid alternate wash and dry abrasion tests. Shrinkage may also be investigated in the Dynamic Dimensional Change Meter and in the Accelerotor. The object of these added laboratory tests is to correlate laboratory instruments and methods with end-use effects, looking toward reliable rapid tests.

Mail Votes on Test Methods

TCR has a large ex-officio membership. All Councilors, Research Committee Chairmen and Sectional Research Advisory Committee Chairmen are ex-officio members. About two hundred copies of a test method are mailed for vote. Many individuals do not feel qualified to vote on specific scientific or technical matters, but may take advantage of "not voting" privileges. The core of qualified critical voters on specific subjects is usually very small in proportion to the total voting power. The parliamentary aspect of ex-officio members was discussed.

Research Division Files and Records

An investigator retained to judge the status of files, records and archives of the Association expressed special commendation for the excellent files and systems in the Research Division and the efficiency and abilities of Miss Meehan. No changes were suggested.

Detailed Project Reports

Details of the project work were to be reported by the chairmen of the various committees involved.

COMMITTEE ON WOOL SCOURING———E A Leonard reported as follows.

1) The following persons attended a meeting at the Statler Hotel in New

York, January 17, 1957: H Wollner, American Conditioning House; J Bauer, Collins & Aikman Corp; E C Hansen, General Aniline & Film Corp; E A Leonard, General Foods Corp.

2) The technical paper which the Committee is preparing for publication on the subject of "Fadeable Dirt in Wool" was reviewed. After a few small changes were made, it was agreed that Mr Hansen will have a draft typed and circulated to the members and Mr Leonard will add further material to complete the draft.

3) The problem of AATCC supplies of grease wool yarn for Test Method 64-52 was considered. Mr Wollner advised that he had been asked by Richard Frey to assist in locating a supply. After discussion, Mr Wollner agreed to pick this up from the point where Werner Klaas now stands. Mr Hansen will contact Mr Klaas to find out the results of his associations with wool suppliers and will advise Mr Wollner accordingly.

4) Since Mr Leonard's term of chairmanship has expired and he has moved to an industry not connected with the work of this Committee, the subject of a new chairman was taken up. A motion was made and carried that Mr Hansen be recommended for chairmanship of the Committee. This recommendation has been forwarded to the Technical Committee on Research.

Chairman Sylvester requested approval to develop a standard method of colorfastness evaluation based on the Gray Scale and the AATCC chart for measuring transference of color. Mr Appel, Mr Babey, and the chairman will review the present methods of evaluation and grading, and work out the proposed standard method. Approval was granted.

Respectfully submitted,
J A WOODRUFF, *Secretary*

History of the Art of Textile Printing—

(*concluded from page P170*)

Perrotine and cylinder print machines in each. He describes the dyes which were in use at that time.

What were the colorists using? On cotton, for yellow, there were quercitron bark and Persian berries; for red and pink, madder, the Turkey red of the dyer, which was fixed with alumina mordant, and which also served for violet with iron mordant. Black was printed with logwood, using chrome mordant, with brazilwood for browns and garnets, while natural indigo served for blue.

Wool and silk were more difficult. The cloth was first dyed in a bright color, then discharged yellow with nitric acid, or over-printed in black with logwood. Green was made by combining the nitric acid with prussiate of soda. The first prints on white wool and silk in which the dyes were fixed by steaming after printing, and in which the thickening agents were washed out of the goods leaving a soft and supple hand, signaled an important forward step.

Complementing the natural dyes, for which new methods were constantly being exploited, were the mineral dyes—iron buff, Prussian blue, manganese bronze and yellow chromate of lead. But the beginning of the modern epoch in textile printing was marked by the discovery of the first synthetic dyestuff, mauve, by Perkin in 1856.

Soon after mauve came aniline black which was first printed by John Lightfoot in 1863, and which has been the problem child of textile colorists for nearly a hundred years. Then followed the white discharge printing of dyed indigo, achieved in various ways, culminating in the hydrosulfite reduction method. With discharge printing colored effects can be achieved on a dyed background.

Invention of different synthetic dyes followed quickly. Basic and mordant colors were followed by the vats, and at the turn of the century, we record the creation of the important anthraquinone vat dyestuffs. It was not until the 1920's that the naphthol series, born from the earlier para red, gave us the present full line of fast ingrain colors.

Today, we use practically no vegetable dye. Our coloring matters are tailor-made and standardized in depth, hue and brilliance. Our methods of applying them are not limited by the restrictions of roller printing alone, for we have found that special effects require special equipment, and a host of artisans compete with the roller printer in their various particular processes.

MODERN APPROACHES

We will mention just a few of these modern approaches to the art of textile printing. In screen printing the material to be printed is laid flat on tables and the color paste is applied through silk screens by means of a flat blade called a squeegee. Very large objects can be printed beyond the scope of the roller print machine, and brighter and richer shades are possible in this hand process. The success of the screen printed article has fostered the invention of so-called screen-printing machines, which do the same work mechanically in accurate repeats.

An interesting form of printing is the polychrome process. The patents indicate it was first invented in Russia and is quite a novel approach. The roller which does the printing is composed of the dyestuff pastes molded together in a mosiac or roughly floral pattern, and hardened. The mold is turned down on a lathe and is ready for the print machine. The cloth to be printed must be wet, so that in contact with the polychrome roller it picks up the pattern. First produced on silk, it eventually found its way to rayon and cotton.

There is little novelty in the idea of applying the dyestuff solutions through a stencil, but when these dyes are applied with a spray gun, beautifully shaded ombré effects are possible. This method is used for tablecloths where the large patterns permit a certain artistry.

One of the latest developments is a process known as "embo" printing, wherein the cloth is embossed and printed in color at the same time, producing a sculptured effect. The embossing rollers are tipped with dye paste before coming in contact with the cloth, which is later cured to set the embossing. This type of printing employs pigments which are resin-fixed in the same curing operation.

CONCLUSION

As long as Dame Fashion dictates the market, man's ingenuity will be excited to more and more interesting methods of textile printing. Sometimes a long-discarded process is resurrected and improved upon, as in the so-called flock-printing process, which is just an adaptation of the gold and silver printing of the nuns of Nuremberg.

Whatever ingenuity is needed will be supplied by the chemist, by the engineer, by the designer and by the colorist, each working with skill in his hand, with experience in his mind and eye, and with beauty in his heart.

Papers presented at the Perkin Centennial under AATCC sponsorship:

"The Development of Fast Colors for Textiles"—F M Fordemwalt, American Cyanamid Co

"The Development of Modern Textile Dyeing Techniques"—P L Meunier, E I du Pont de Nemours & Co, Inc

"The Application of Colorants to Glass Fibers"—R F Caroselli, Owens-Corning Fiberglas Corp

Papers presented before local sections:

"Lighting Factors to be Considered in Textile Color Matching"—Warren B Reese, Macbeth Daylighting Corp

"Binders for Nonwoven Fabrics"—Neil H Sherwood, B F Goodrich Research Center

"Technology of Nonwoven Fabrics"—L G Lovin and L P Wenzell, Celanese Corp of America

"Developments of Science and Industry in the South"—Frank J Soday, The Chemstrand Corp

"Random Tumble Pilling Tester"—A G Scroggie, E I du Pont de Nemours & Co, Inc

"Recent Developments in Vat Dyeing"— J M Fletcher, E I du Pont de Nemours & Co, Inc

"Fluorescent White Dyes: How They Work and How They are Evaluated"—Eugene Allen, American Cyanamid Co

"The New Look in Military Purchasing and Distribution of Textiles"—Victor J MacLaughlin, U S Army

"Frontiers in Fabrics and Finishes"—T J Seery, Dept of the Navy

Future Papers

The following material has been submitted to date to the publishers of American Dyestuff Reporter. Subject to the approval of the AATCC Publications Committee, it will appear in the Proceedings in future issues.

Authors, section officials, and committee chairmen are requested to inspect this list and notify the publishers if there are any omissions.

"How Atomic Warfare has Changed Army Requirements for Textiles"—S J Kennedy, US Army Quartermaster Corps

"Changing Trends in Requirements for Parachute Textile Materials"—J H Ross, Wright Air Development Center

Miscellaneous:

"Leucoesters of Vat Dyestuffs"—Hans Luttringhaus, Progressive Color & Chemical Co

Other Perkin Centennial Papers

"A Century of Progress in Colorfastness Test Methods"—M L Staples, Ontario Research Foundation

"The Standard Depths of Shade in Relation to the Assessment of Colorfastness of Dyes on Textiles"—Paul Rabe, Farbenfabriken Bayer AG

"Dyes and Dyeing Processes for Special Properties of Color"—J S Kirk, General Dyestuff Co

"Progress in Measuring Color Difference"—G W Ingle, Monsanto Chemical Co

"The Use of Color in National Defense"—S J Kennedy, Quartermaster Research and Development Command

"Seeing Light and Color"—Ralph M Evans, Eastman Kodak Co

"The Chemistry of Organic Pigments"—A Siegal and W S Struve, E I du Pont de Nemours & Co, Inc

"Color in Relation to the Political and Economic History of the Western World"—S M Edelstein, Dexter Chemical Corp

"Color in Ancient Times"—Earle R Caley, Ohio State Univ

"Color Designation through the Ages"—Ernest R Kaswell, Fabric Research Laboratories, Inc

"Early Synthetic Dyes"—Hans Z Lecher, consultant

"Synthetic Dyes for Cotton"—D I Randall, General Aniline & Film Corp

"Dyes for Animal Fibers"—James Ogilvie, National Aniline Div

"Dyes for the Hydrophobic Fibers"—H E Schroeder and S N Boyd, E I du Pont de Nemours & Co, Inc

"Fluorescent White Dyes"—Robert S Long, American Cyanamid Co

"The Theory of Dyeing Cellulosic Fibers"—Emery I Valko, Onyx Oil & Chemical Co

"Theory of Dyeing Polyester and Polyacrylic Fibers"—W R Remington and H E Schroeder, E I du Pont de Nemours & Co, Inc

Employment Register

This column is open for two insertions per year, per member, without charge. Blanks can be obtained from, and filed with, the secretary of the Association, Post Office Box 28, Lowell, Mass. It is understood that these will be open to inspection by prospective employers who can obtain further information from the secretary.

57-4

Education: University of Paris; State Textile Vocational School, Brno, Czechoslovakia — Degree textile chemist, dyeing & finishing.

Experience: 18 years experience: Dyeing-finishing cotton & synthetics; plant chemist.

Age: 38; Married; References.

Position Desired: Asst plant mgr—supt, dyeing & finishing.

Locations Desired: Anywhere USA: South America.

Membership Applications

SENIOR

Colin L Browne—Textile chemist, Charlotte Development Labs, Celanese Corp of America, Charlotte, NC. Sponsors: M J Myles, F Fortess.

Gultekin Celikiz—Research chemist, Philadelphia Textile Inst, Philadelphia, Pa. Sponsors: P Theel, J L R Landry, Jr.

Eugene Gula—Assist lab dir, J P Stevens & Co, Inc, New York, N Y. Sponsors: N B Gobeil, L C Kolodny.

Charlie L Mullennix—Head dyer, Philadelphia Hosiery Mills, Philadelphia, Tenn. Sponsors: J T Bohannon, Jr, D Waller.

George E Prime—Chemist, Stein, Hall & Co, Inc, Southern Tex Lab, Charlotte, NC. Sponsors: J B Wathey, D E Truax.

George N Sandor—Techn delegate, Farbwerke Hoechst AG, Frankfurt, Germany. Sponsors: H Luttringhaus, C Z Draves.

Anthony M Scafidi—Lab techn, Para-Chem, Inc, Philadelphia, Pa. Sponsors: J E Kerr, F J DeMaria.

William F Smith—Boss dyer, Windsor Mfg Co, Philadelphia, Pa. Sponsors: R Nebelung, G W Oughton.

John D Sterling, Jr—Research chemist, E I du Pont de Nemours & Co, Inc, Deepwater, NJ. Sponsors: A J Johnson, R A Brooks.

Robert L Stultz, Jr—Research chemist, Carbide & Carbon Chemicals Co, South Charleston, W Va. Sponsors: R G Curtis, S P Hersh.

Gregory L Tite—Overseer, wet & dry finishing, Charlton Woolen Co, Charlton City, Mass. Sponsors: W W Pennock, E W Bullard.

(*concluded on page P183*)

AATCC Calendar

COUNCIL

Mar 29 (Hotel Roanoke, Roanoke, Va); June 7 (New York)

NATIONAL CONVENTIONS

Nov 14-16, 1957 (Hotel Statler, Boston); 1958 (Hotel Conrad Hilton, Chicago); 1959 (Sheraton Park and Shoreham Hotels, Washington, D C); 1960 (Philadelphia, Pa); 1961 (Buffalo, NY)

HUDSON-MOHAWK SECTION

Mar 29 (Johnstown, NY); May 17 (Ladies Nite—Schuyler Meadows, Albany, NY); June 21 (Outing—Antlers Country Club, Amsterdam, NY)

MID-WEST SECTION

April 27 (Netherland Hilton Hotel, Cincinnati, O); June 14-15 (Outing—Brown's Lake Resort, Burlington, Wis); October 26 (Bismarck Hotel, Chicago, Ill)

NEW YORK SECTION

Apr 26, May 24—ladies nite (Kohler's Swiss Chalet, Rochelle Park, NJ); June (Annual Outing)

NIAGARA FRONTIER SECTION

Mar 15 (Buffalo, NY); Apr 5 (Joint meeting with CATCC at Kitchener, Ont)

NORTHERN NEW ENGLAND SECTION

May 10 (Lowell Tech Inst, Lowell, Mass); Sept 13 (Outing—Wachusett Country Club, W Bolyston, Mass); Dec 6 (Annual meeting, Hotel Continental, Cambridge, Mass)

PIEDMONT SECTION

Mar 30 (Hotel Roanoke, Roanoke, Va); June 7-9 (Outing—Mayview Manor, Blowing Rock, NC); Sept 28 (Hotel Barringer, Charlotte, NC)

RHODE ISLAND SECTION

Mar 28 (Providence Engineering Society, Providence, RI); Apr 25 (Student Night—New Bedford ITT, New Bedford, Mass); June 14 (Outing—Warwick CC and Rocky Point, RI); Sept 27 (Ladies Night—Narragansett Hotel, Providence, RI); Oct 24 (Prov Eng Soc) Dec 5 (Annual Meeting—Johnson's Hummocks Grill, Providence, RI)

SOUTH CENTRAL SECTION

Apr 27 (Hotel Patton, Chattanooga, Tenn); June 21-22 (Outing—Lookout Mtn, Tenn); Sept 20 (Hotel Patton)

SOUTHEASTERN SECTION

Apr 13 (Legion Hall, Lindale, Ga); June 7-9 (Outing—Radium Springs, Ga); Sept 14 (Harmony Club, Columbus, Ga); Dec 7 (Dinkler Plaza Hotel, Atlanta, Ga)

WESTERN NEW ENGLAND SECTION

Mar 15 (Rapp's Restaurant, Shelton, Conn); May 17 (Ladies Night—Waverly Inn, Cheshire, Conn); June 14 (Outing—Wallingford, Conn); Sept 27 (Rapp's); Nov 1 (Annual meeting—Hartford area); Dec 13 (Rapp's)

Activities of the Local Sections

Southeastern

THE Southeastern Section meeting of February 22, 1957, with J Elwood Barbre, Pepperell Mfg Co, sectional committeeman in charge, attracted some 150 members and wives.

Through the courtesy of Homer Carter, plant manager, and Bert Hill, assistant plant manager, AATCC members were permitted a tour of the Pepperell Manufacturing Company's plant at Pepperell, Ala.

The technical session consisted of a talk by Walter H Hindle, assistant director of research for Chemstrand Corp, Decatur, Ala, on the subject, "A New Method of Dyeing Nylon and Acrilan in a Blend with Wool and Cotton."

The wives of the officials of Pepperell entertained some 25 wives of attending members at a bridge party in the Pepperell Guest House. Later a social hour and meal was enjoyed by AATCC Members and their wives at the Saugahatchee Country Club, near Opelika, Ala.

South Central

THE South Central Section will hold its Spring Meeting on Saturday, April 27th at the Hotel Patten, Chattanooga, Tenn.

The use of ultrasonics in dyeing and wet processing will be the topic of the technical session, which will begin at 4:30 pm. The speaker will be a member of the staff of the Institute of Textile Technology, Charlottesville, Va.

At the evening banquet, all past chairmen will be honored.

Delaware Valley

GUEST lecturers for the management course sponsored by the Educational Committee of the Delaware Valley Section in conjunction with the Philadelphia Textile Institute will be as follows:

March 11—"Economics of Textiles"—Herman Michl, faculty, Univ of Delaware and PTI

March 18—"Practical Problems in Purchasing"—Harold F Jones, manager, Basic Materials Div, E I du Pont de Nemours & Co, Inc

March 25—"Cost Accounting for Effective Control"—Franklin R Ehman, controller, Hellwig Dyeing Co

April 1—"Inventory Control"—Hans Halback, superintendent of planning, Berkshire Knitting Mills

April 8—"Labor Relations at the Mill Level"—Edward B Shils, executive secretary, Knitted Outerwear Manufacturers' Association

April 15—"Personnel Management and Problems"—George C Horst, personnel director, American Viscose Corp

The lectures will be held at the Philadelphia Textile Institute, School House Lane and Henry Ave, Philadelphia, Pa, from 7:30 to 9:30 pm on the dates mentioned.

Hudson-Mohawk

The Hudson-Mohawk Section met on Friday, January 25th, at Jack's Restaurant, Albany, NY, with approximately 60 members and guests in attendance. Guest speaker of the evening was Walter J Hamburger, Fabric Research Laboratories, Inc, who spoke on "Research—The Modern Ingredient of Quality".

The next meeting of the Section will be held March 29th in the Johnstown, NY, area. Guest speaker will be Leonard Shapiro, American Polymer Co.

Mid-West

THE Mid-Winter Meeting of the Mid-West Section was held at the Bismarck Hotel, Chicago, Ill, on February 16, 1957.

The afternoon session, which attracted approximately 72 members and guests, featured a paper by Arthur Klein, American Cyanamid Co, on the subject "The Development of Color"—the taking of an interesting compound from research and developing it into a usable dyestuff.

During the business portion of the afternoon session, Chairman Samuel M Littlejohn reminded members of the availability to qualified candidates of the scholarship sponsored by the Section.

Elliott Morrill, chairman of the 1958 AATCC Convention to be held in Chicago, announced that committees have been formed with respective chairmen already working toward a

successful affair. Victor Braun has been appointed treasurer of the Convention. A meeting of all chairmen has been called for 9:30 am, Saturday, April 27, at the Netherland Hilton Hotel, Cincinnati, O.

At the evening session, Thomas Elliott, district sales manager of Munsingwear, Inc, spoke on "The Development of Color for Sales". Mr Elliott's talk was supplemented with an exhibit of garments to illustrate the impact of color to stimulate buying by the consumer.

SPEAKERS' TABLE (l to r): Arthur L Klein, American Cyanamid Co, guest speaker at the afternoon session; Kenneth M Harms, Morgan Dyeing & Bleaching, treasurer; Warren B Broadbent, Geigy Dyestuffs, secretary; Samuel M Littlejohn, Munsingwear, Inc, chairman; T D Elliott, Munsingwear, Inc, guest speaker at the evening session; Jack G Kelley, E I du Pont de Nemours & Co, Inc, vice chairman

***(L to r):* John A Turner, Earl Brittan, Arthur Hultberg, Elliott Morrill, Frank S Stover, Frank F Beverly, L B MacFarland, H T Latham**

***Sitting (l to r):* Raymond L Burnett, Bernard Isenogle, Frank H Gurry, Charles H Sillin, George Fauby**
***Standing (l to r):* William W Graham, William D La Vey, Fred W Dale**

***(L to r):* Dick Waski, Mr and Mrs Glenn Templeton, Cal Seitz, Art Klein**

***(L to r):* R V Leary, R R Blank, E L Miller, Frank J Acker, Leslie Meyer**

Membership Applications

(concluded from page P161)

JUNIOR

Gerald T Gallagher—Chemist, Becco Chemical Div, Food Machinery & Chemical Corp, Buffalo, NY. Sponsors: N Weinberg, B K Easton.

ASSOCIATE

Gorman E Eilbeck—Techn man, Products Application Lab, B F Goodrich Chemical Co, Avon Lake, O.

Robert E Giauque—General mgr, Gabb Special Products, Inc, Windsor Locks, Conn.

Jack D Gilberg—Sales repres, General Chemical Div, Vancouver, Wash.

K N Hussain—Text machinery dealer, distributors & agents for dyes, chemicals & aux, Al-Ameen Trading Corp, Karachi, Pakistan.

Ruth Johnson—Textile lab supervisor, Canadian Res Inst of Launderers & Cleaners, Ottawa, Ont, Canada.

John H Markert—Sales engineer, Industrial Div, Tower Iron Wks, Inc, Providence, RI.

Richard T Mould—Sales repres, Becco Chemical Div, Food Machinery & Chemical Corp, Buffalo, NY.

Herbert F Tucker—Mgr, Industrial Div, Tower Iron Wks, Inc, Providence, RI.

CORPORATE

Lebanon Woolen Mills

APPLICATION FOR TRANSFER TO SENIOR MEMBERSHIP

Albert L Bianco

STUDENT

Joan L Marvel—Purdue University. Sponsor: R W Padgett.

Barbara L Niemeyer—Purdue University. Sponsor: R W Padgett.

Susanne M Wheaton—Purdue University. Sponsor: R W Padgett.

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Frank G Pielenz—North Carolina State College. Sponsor: H A Rutherford.

Mary Ann Hanrahan—New Bedford Inst of Textiles & Technology. Sponsor: F Tripp.

James B DeMelo—Bradford Durfee Technical Institute. Sponsor: J Watters.

Thomas R Beaudet—Rhode Island School of Design. Sponsor: W S Huber.

Sukhlal S Parekh—Philadelphia Textile Institute. Sponsor: W H Hughes.

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Assistant Secretary .. RICHARD R FREY, P O Box 28, Lowell, Mass
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Treasurer Emeritus ..... WILLIAM R MOORHOUSE, P O Box 353, South Yarmouth, Mass
Founder ..... LOUIS A OLNEY (Deceased)
Director of Research ..... HAROLD W STIEGLER, Lowell Technological Institute, Lowell, Mass

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Treasurer—A E STUTZKE

NIAGARA FRONTIER

Chairman ..... WILLIAM H LEYKING, National Aniline Div, Allied Chemical & Dye Corp, 1015 S Park Ave, Buffalo, N Y
Secretary ..... NORBERT WEINBERG, Becco Chemical Div, Food Machinery & Chemical Corp, Sta B, Buffalo 7, N Y
Vice Chairman—K A LISTER *Treasurer*—A M VIDITZ-WARD

HUDSON-MOHAWK

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Southern Region

PIEDMONT

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Secretary ..... LINTON C REYNOLDS, Riegel Textile Corp, Box 393, Ware Shoals, S C
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Secretary ..... FRANKLIN E CATER, Ray-Ser Dyeing Co, Box 5037, Chattanooga 6, Tenn
Vice Chairman—E V HELMS *Treasurer*—E F JURCZAK

SOUTHEASTERN

Chairman ..... JAMES W SWINEY, Fulton Bag & Cotton Mills, Atlanta, Ga.
Secretary ..... EDWARD R RAVENEL, Morton Salt Co, 538 E Ponce de Leon Ave, Decatur, Ga.
Vice Chairman—W B GRIFFIN *Treasurer*—W B FAYSSOUX

WASHINGTON

Chairman .. GEORGE P FULTON, National Institute of Drycleaning, Inc, 909 Burlington Ave, Silver Spring, Md
Secretary ... NELSON F GETCHELL, National Cotton Council of America, 1832 M St, Washington 6, D C
Vice Chairman—A M SOOKNE *Treasurer*—L R MIZELL

Western Region

MID-WEST

Chairman ..... SAMUEL M LITTLEJOHN, Munsingwear, Inc, 718 Glenwood Ave, Minneapolis 5, Minn
Secretary ..... WARREN B BROADBENT, Geigy Dyestuffs, 629 West Washington Blvd, Chicago, Ill
Vice Chairman—J G KELLEY *Treasurer*—K M HARMS

PACIFIC NORTHWEST

Chairman ..... THOMAS B KAY, JR, Thomas Kay Woolen Mills, 760 South 12th St, Salem, Ore
Secretary .. FREDERICK H IHLENBURG, National Aniline Div, Allied Chemical & Dye Corp, 730 Burnside St, Portland 9, Ore
Vice Chairman—B R KOENIG *Treasurer*—D W KIMSEY

PACIFIC SOUTHWEST

Chairman .. ROBERT A FLIEGEL, National Dyeing & Finishing Corp, 3505 Hayden Ave, Culver City, Calif
Secretary .. CLARICE H LINDSEY, Univ of Calif, Dept of Home Economics, Los Angeles 24, Calif
Vice Chairman—R D ANDERSON *Treasurer*—W M CAMPBELL

BOOK REVIEW

PERSPECTIVES IN ORGANIC CHEMISTRY

Sir Alexander Todd, editor
Interscience Publishers, Inc
New York, 1956
527 pages; $7.50

In a book with the title of "Perspectives in Organic Chemistry", the reader expects to obtain a true representation of organic chemistry today. The reader will not be disappointed, for the volume presents accurate and comprehensive essays on organic chemistry's foremost topics.

Under the able editorship of Sir Alexander Todd, a group of distinguished scientists have contributed articles on a diversity of topics. These topics include the following:

"The Nature of the Theory of Resonance", Linus Pauling
"Reaction Mechanisms", Paul D Bartlett
"The Development of the Concept of Aromaticity", Wilson Baker
"Stereochemistry", D H R Barton
"Die Bedeutung der vielgliedrigen Ringverbindungen fur die theoretische organische Chemie"; ("The Importance of many-membered cyclic compounds in theoretical organic Chemistry"), V Prelog
"Biosynthetic Theories in Organic Chemistry", A J Birch
"Synthesis", R B Woodward
"Neue Entwicklungen der metallorganischen Synthese"; ("New Developments in Organometallic Syntheses"), Karl Ziegler
"Carbohydrates", E L Hirst
"Nucleic Acids", Sir Alexander Todd
"Bedeutung der theoretischen organischen Chemie für die Chemie der Terpenverbindungen"; ("The significance of theoretical Organic Chemistry as applied to Terpene Chemistry), L Ruzicka
"Steroids", C W Shoppee
"Alkaloids", E Schlitter
"Isotopes in Organic Chemistry", J W Cornforth
"Microorganisms in Organic Chemistry", Karl Folkers
"Chemotherapy", James Walker
"Organic Chemistry and Conifer Taxonomy," Holger Erdtman
"Organische Chemie und Genetik"; (Organic Chemistry and Genetics), A Butenandt

The choice of topics, clearity of expression and ample references truly combine to serve as a tribute to one of the "great masters" of organic chemistry, Sir Robert Robinson.—RON

LANGE'S HANDBOOK OF CHEMISTRY

Handbook Publishers, Inc
Sandusky, Ohio
1985 pages; $8.50

Though edited and compiled by chemists for chemists, this handbook, now in its ninth edition, contains factual information on chemicals and related materials which should prove of great value to the engineer, physicist, patent attorney, and others as well.

Among the new entries of importance to the textile chemist and engineer are the following:

drying agents
relative humidities and aqueous tensions of sulfuric acid, sodium hydroxide and calcium chloride solutions
fundamental constants for physical chemistry
viscosity comparison chart
hydrometer scales comparisons
polarography.

The excellent quality of paper and print, numerous literature references, catalog numbers for ordering reagents, and a comprehensive index of more than three thousand entries serve to illustrate the indispensability of this volume.—RON

THE MECHANICAL PROPERTIES OF TEXTILE FIBERS

(Vol 7—Deformation and Flow Series)

R Meredith, editor
Interscience Publishers, Inc
New York, NY
333 pages; $8.75

This monograph has filled a lack of text material in the field of fiber properties. Since this excellent work is part of a series of monographs on the rheological behavior of natural and synthetic products, most of the material is covered from the standpoint of the delayed deformation properties of some natural and synthetic fibers.

The book covers the subject by starting with an introductory chapter on the molecular structure of fibers and the mechanism of deformation of fibers. The cellulose fibers, protein fibers and synthetic fibers are then discussed in that order. Although the topics vary slightly from fiber type to fiber type, they are in general concerned with the following: structure, relaxation and creep, stress-strain relations, reaction-rate, dynamic mechanical properties, strength, kinetic theory and resilience and creasing.

The approach to the subjects is fairly mathematical, but the text is so well developed that even the person who shuns the mathematics of thermodynamics can read the book profitably and without strain.

If the reader wishes to make comparisons between the properties of fibers of the different types, he must make references to different sections of the book. However, since the original intent of the editor was 1) to utilize the specialized knowledge of the contributors to best advantage and 2) to make it simpler for the reader to find information about a specific class of fibers, it must be agreed that this goal was achieved.

The book is recommended to everyone who has any interest in fibers, their properties and applications.—CAH

ASTM STANDARDS ON SOAPS AND OTHER DETERGENTS (WITH RELATED INFORMATION)

Prepared by ASTM Committee D-12
American Society for Testing Materials
1916 Race St, Philadelphia 3, Pa
176 pages; $2.50
6x9 heavy paper cover

This revision of the 1952 publication contains 42 specifications and tests, including all of the ASTM standards and tentatives pertaining to soaps and other detergents. It is compiled in convenient form for use in industry and includes a section on standard definitions of terms relating to soaps and other detergents.

The following is a list of new standards published in this edition: Tentative Methods for Sampling and Analysis of Sodium Triphosphate (D 501-55T); Tentative Method of Test for Buffering Action of Metal Cleaners (D 1279-53 T); Tentative Method of Total Immersion Corrosion Test for Soak Tank Metal Cleaners (D 1280-53T); Tentative Method of Test for Rinsing Properties of Metal Cleaners (D 1281-53 T); Tentative Methods of Test for Surface and Interfacial Tension of Solutions of Surface-Active Agents (D 1331-54T); and Tentative Method of Aerated Total Immersion Corrosion Test for Metal Cleaners (D 1374-55T).—EPJ

CHEMICAL-ENGINEERING COST ESTIMATION

McGraw-Hill Book Co, Inc
New York, NY, 1956
263 pages; $6.00

This volume offers a terminology to aid the engineer or chemist to present clear-cut advice to management on the economic factors of estimating and evaluating plant installation and manufacturing costs.

The authors' aim is to develop the principles of cost estimation and then, through the use of up-to-date data, present solutions of selected current industrial problems.

The aspects of cost estimating covered in ten chapters are: capital investment; plant cost; manufacturing cost; general expense; sales and profit; conditions affecting cost and profit; plant location; components of cost; economic evaluation of projects.

Unnecessary space is devoted to listing price quotations of "various" chemicals.

There is an extensive list of references at the end of each chapter and a section devoted to the solution of eighteen sample problems preceding the index.—RWE

OFFICIAL METHODS OF ANALYSIS OF THE ASSOCIATION OF OFFICIAL AGRICULTURAL CHEMISTS (Eighth Edition—1955)

Association of Official Agricultural Chemists
PO Box 540, Benjamin Franklin Station
Washington, DC
1008 pages; $12.00
(supplements $1.25 additional)

This complete reference of official methods of the AOAC includes all the standardized procedures accepted by the association as of March 17, 1955. Subsequent changes (1955-1958, inclusive) may be obtained in supplement form and the ninth edition will be available in 1960.

The eighth edition of this widely used publication has been expanded to include the following: up-to-date material chiefly in the fields of pesticides, flavoring extracts, drugs, extraneous materials, microchemical methods, and nutritional adjuncts (including vitamins); a chapter on spectroscopic methods; and a section on hormone drugs.

The Official Methods of Analysis of the AOAC is an especially useful reference text for governmental regulatory agencies (federal, state, and municipal); for specifications (governmental and private); and for research workers, particularly in the agricultural field.—EPJ

CHEMICAL MARKET RESEARCH IN PRACTICE

(No. 1—Series in Chemical Engineering)

Richard E Chaddock, editor
Reinhold Publishing Corp
New York, NY

This little book on market research in the chemical industry is a valiant effort aimed at acquainting "all areas of the chemical industry with the advantages market research offers" and of "introducing the college student to chemical market research." It is the opinion of the reviewer that the effort has fallen short.

First, the book must be considered in two parts. The second part (Chapters 10 - 16), consists of brief discussions of the various chemical and related industries, giving general information on the growth and importance of each industry segment, with a brief bibliography of data sources. These chapters, in a general encyclopedic form, add little to a book on chemical market research techniques.

The principal criticism involves the first section of the book (Chapters 1-9, which deal with specific marketing research practices). While the book is aimed to some extent at the college student, it would appear that any student contemplating a market research career would be better put to the task of taking a course in market research at any good college of business administration. Certainly, the fact that "On some typewriters as many as eight or ten (carbon) copies can be made" might be overlooked in a college course on marketing research, but is it necessary to include it in this book? After a college course the student would be better prepared to handle market research projects than would an employee of the company who was transferred into the job because he knew something about chemistry. The fact that it is more important to know something about proper research techniques than about the product to be researched is apparently overlooked by the various contributors. A trained market research person can easily secure the needed technical information he needs from other employees of the company, but the reverse situation is not likely to exist.

It is unfortunate that the weakest chapter in the book is the first. Instead of arousing an interest in the reader to go on further into the book, the numerous errors in the treatment of simple economic situations would more likely cause the reader to question the advisability of proceeding further along. Some of the more important questionable economic statements involve the rather elaborate break-even analysis that the author employs. The author shows a firm with constantly diminishing costs (he calls it the "so-called secret of mass production"). While such a condition is theoretically correct, it is necessary to assume constant factor costs for such a situation to come about. Since he is dealing with a time element in his analysis, such an assumption is a little difficult to take. Even the most abstract firm analyses show an average cost curve that slopes upward somewhere past the point of optimum costs.

There is also no indication of how the author selected the break-even point on his chart. On the commonly accepted break - even chart, the break-even point is located at the intersection of the revenue curve and the total cost curve. Because the author inserts a time element into his analysis, it is only proper to assume that the firm is trying to maximize its profit in the long-run. If we accept the author's statement that the "producer who builds his plant to the right capacity at the start" has an advantage over his competitor who starts small and enlarges his productive facilities as demand increases, we should also expect this producer to select the best price at the start and not to wait to reach this point as time unfolds and demand conditions change. If he cannot choose the long-run price, how can he choose the long-run optimum plant size?

There is one particular statement which is worthy of reprinting here (the italics are the authors). "Very few companies today are small enough to afford the luxury of having their market research done by the chief executive. *No company today can afford to do no market research at all.*" This honest but grammatically incorrect statement serves to characterize the unsuccessful attempt to teach market research techniques by example and not by theory. The able practitioner has to be able to do more than say to the novice, "Watch me." These able people have fallen short of their goal by not being able to teach the underlying basic theory.

The book is useful as a checklist for a market researcher to enable him to verify that he is using, or is aware of, all the existing techniques. It should not be used as book of instruction for the novice or college student.—SLM

(concluded on page 192)

News of the Trade

Brick

Intex Chemical Corp Formed

Formation of a new company for the manufacture and sale of a complete line of industrial and textile chemicals and auxiliaries, Intex Chemical Corporation, has been announced by Leon P Brick, president of the new concern.

Intex, which is now completing organization of its research, technical service, production and sales staffs, will have its main office and plant at 167 Main Street, Lodi, NJ.

Mr Brick brings to the new company more than three decades of experience in the chemical industry. He resigned on February 14 from his post as executive vice president of Onyx Oil & Chemical Company of Jersey City, with which he had been associated for 30 years. Prior to that, Mr Brick was with E I du Pont de Nemours & Co, Inc.

Borden's Opens New Formaldehyde Plant

A new formaldehyde plant with an annual production capacity of 36 million pounds was opened during formal ceremonies on Feb 11 at Kent, Wash, by the Borden Company's Chemical Division. The firm has a similar operation at Springfield, Ore. Addition of the Kent facilities reportedly enables Borden's to become the largest formaldehyde producer on the West Coast.

The Kent operation will be the first to use Borden's Karl Fischer process, for which US rights were leased last year from Apparate und Rohrleitungsban in West Germany. The process is said to permit a higher yield in formaldehyde production and lower utility and steam requirements for processing. A 93 percent yield is anticipated, as compared with the national average of 82 to 88 percent.

State business and civic leaders participated in the Kent ceremonies. Borden officials present included William R Moffitt of New York, a vice president of the Chemical Division; Ray T Hanson, West Coast general manager, and Ben B Butler, West Coast production manager.

The Kent opening raises Borden's West Coast chemical operations to five and brings its foreign and domestic chemical plant total to 25. The Chemical Division has an extensive Centennial year expansion program underway. Other plant openings are scheduled during 1957.

Geigy Mounts Stepped-up Promotional Drive for Mitin

An expanded, coordinated advertising, promotion and publicity program was launched on March 1st in the USA and Canada by Geigy Dyestuffs, Division of Geigy Chemical Corporation, to promote Mitin, its durable mothproofer.

The advertising budget, considerably expanded from last year, will feature, beside comprehensive trade advertising, major insertions in women's service and fashion magazines. Each advertisement will be keyed to a specific type of Mitin-mothproofed merchandise such as blankets, carpets, drapery and upholstery fabrics and all types of wearing apparel, with full mill credits. The Good Housekeeping Seal of Approval will be featured in all ads.

Simultaneous with each ad's appearance, publicity concerning the merchandise involved will be sent to appropriate editors of newspapers in cities where the merchandise is available. Geigy's merchandise field representatives will contact the stores and assist in setting up window and counter displays featuring these ads and adequate sales aids. Field representatives will also contact local newspaper editors to acquaint them with the promotional program to tie in with local stores. They will arrange radio and TV features and fashion shows based on local store promotions. The field representatives will also set up sales training programs for store personnel to acquaint them with the advantages of Mitin as a sales and promotional tool.

Other Mitin publicity will be aimed at syndicated columnists, consumer magazines, radio-TV commentators, special interest publications and the trade.

The campaign will be augmented by telecasts of Geigy's award-winning documentary film, "Insects Astray."

Verona Offering Pharma Line

Verona Dyestuffs, division of Verona Chemical Co, is now offering direct the complete line of Pharma products, including the Pharmasols and Pharmols, in addition to its own line of products previously offered to the trade.

As previously noted, Verona Chemical Co recently purchased all outstanding capital stock of Pharma Chemical Corp, Bayonne, NJ.

P & S to Expand Manufacturing Facilities

Proctor & Schwartz, Inc, Philadelphia has announced plans to expand its machinery manufacturing facilities by establishing an additional plant at Waynesville, NC. The new plant will occupy between 50,000 and 75,000 sq ft on a 27½-acre site along the Southern Railway tracks between Waynesville and Lake Junaluska.

The Waynesville operation will be started on a small scale, employing local people, and manufacturing initially textile-fiber-processing machinery. Later the Company plans to advance into sheet metal work and the manufacture of drying equipment for the industries it serves.

The company has stated that it does not have the space to expand further at the present location and is not moving out of Philadelphia.

Proctor & Schwartz has announced also the appointment of the Fred Whiteside Corp, 10 High Street, Boston, Mass, as manufacturer's agents for certain items in their product line. These products are in addition to those items covered by the Proctor sales organization.

Fred Whiteside's textile background is highlighted by 28 years with Pacific Mills of Boston as purchasing agent, secretary, and assistant treasurer.

Whiteside

1957 Gordon Research Conference on Textiles

The 1957 Gordon Research Conference on Textiles will be held July 8-12 at Colby Junior College, New London, NH, under the chairmanship of H A Secrist. E I Valko will serve as vice chairman.

The schedule:

July 8—"Yarn Torque and Its Implications in the Stability of Fabric", W. J. Hamburger; "Durable Finishing of Hydrophobic Textiles", E I Valko and G C Tesoro.

July 9—"Strain-induced Crystallization in Synthetic Fibers", A B Thompson; "Interpretation of Single Fiber Properties", T B Lefferdink.

July 10—"The Development and Structure of Felted Materials", J J Press; "Non-woven Fabrics", C Harmon.

July 11—"Some New Phenomena in the Behavior of Visco-elastic Materials", K Weissenberg; "The Effect of Chemical Modification on the Flame- and Glow-resistance of Cotton Cellulose", E Pacsu and R F Schwenker.

July 12—"Accelerant Dyeing Phenomena", F Fortess.

Gordon Research Conferences were established to stimulate research in universities, research foundations and industrial laboratories. This purpose is achieved by an informal type of meeting consisting of scheduled lectures and free discussion groups. Sufficient time is available to stimulate informal discussions among the members of a Conference. Meetings are held in the morning and in the evening, Monday through Friday, with the exception of Friday evening. The afternoons are available for recreation, reading or participation in discussion groups as the individual desires. This type of meeting is a valuable means of disseminating information and ideas which otherwise would not be realized through the normal channels of publication and scientific meetings. In addition, scientists in related fields become acquainted and valuable associations are formed which result in collaboration and cooperative effort between different laboratories.

It is hoped that each Conference will extend the frontiers of science by fostering a free and informal exchange of ideas between persons actively interested in the subjects under discussion. The purpose of the program is not to review the known fields of chemistry, but primarily to bring experts up to date as to the latest developments, analyze the significance of these developments, and to provoke suggestions as to underlying theories and profitable methods of approach for making new progress. In order to protect individual rights and to promote discussion, it is an established rule of each Conference that all information presented is not to be used without specific authorization of the individual making the contribution, whether in formal presentation or in discussion. No publications are prepared as emanating from the Conferences.

The first meeting of each Conference is held Monday morning at 9:00 am, Eastern Daylight Saving Time. The morning sessions, through Friday, are scheduled from 9:00 am to 12:00 noon. The second session of each day is held in the evening from 7:30 to 10:00 pm, Monday through Thursday. There are no Friday evening meetings.

Accommodations are available for a limited number of women to attend each Conference, also for wives who wish to accompany their husbands. All such requests should be made at the time of the request for attendance because these limited accommodations will be assigned in the order that specific requests are received. Children twelve years of age and older can be accommodated. Dogs or other animals will not be permitted in the dormitories.

Individuals interested in attending the Conference should request an application form from the office of the director. Attendance at each Conference is limited to 100.

Requests for attendance at the Conferences, or for any additional information should be addressed to W George Parks, director, Department of Chemistry, University of Rhode Island, Kingston, Rhode Island. From June 10th on, mail should be addressed to Colby Junior College, New London, New Hampshire.

Bancroft Announces New Licensees

Joseph Bancroft & Sons Co has announced the granting of additional license applications to firms in this country and abroad who wish to produce fabrics under Bancroft trademarks.

Three new Everglaze licensees are: Adamjee Cotton Mills, Ltd, of Pakistan; Silver Springs Bleaching and Dyeing Co, Ltd of England; and Piraiki-Patraiki Industrie De Cotton, SA of Athens, Greece.

Two licenses have been issued for the production of knit fabrics under the Minicare trademark. They went to Pioneer Valley Finishing Corp of Holyoke, Mass, and Fabric Finishing Company of Passaic, N J.

Sole Chemical Organized

Sole Chemical Corporation has been organized as a highly specialized chemical marketing organization by Solomon Epstein, former executive vice president and general manager of Emulsol Chemical Corporation. Mr Epstein, president and general manager of the new company, stated that the new firm will base its organic specialty sales program on a customized technical service program to the chemical processors, formulators, and manufacturers in the fields of detergents, emulsifiers, germicides, foamers, antifoamers, and other surface-active agents. The administrative headquarters and central development laboratories will be located at 27 East Monroe Street, Chicago, Ill.

7th LTI Open House

A progress report of 20 years' growth and development at Lowell Technological Institute will be revealed to the public at the Institute's seventh Open House program April 5 and 6.

The two-day event will mark the first time since April, 1937 that the Institute has conducted such an undertaking, and on the basis of past experience it is estimated that between 10,000 and 15,000 persons will attend.

Dean of faculty Charles F Edlund, general chairman of the affair, states that, besides showing to the public the engineering and manufacturing facilities and equipment in operation, the premises will offer special exhibits in many areas of textiles, electronics, chemistry, leather, plastics, and paper. Featured also will be a large display of the effects of an atomic blast upon clothing, presented by the AATCC, and an exhibit of jet aircraft engines secured by the Air Force ROTC detachment at Lowell Tech.

A $285,000 program of renovation is currently in progress in the chemistry and textile manufacturing areas of the Institute, and two new plastics and the new electronic engineering laboratories are being installed. The five buildings constructed since the previous Open House will be open for inspection. Curriculum expansion and student activities will be shown side by side with evidences of LTI's physical growth, and there will be numerous special programs of interest.

On Friday, Open House hours will be from 6 pm to 9 pm and on Saturday, from 10 am to 5 pm. One week prior to the Open House, on March 29 and 30, LTI will sponsor Technorama, a science fair for 51 high schools in the Merrimack Valley's 36 cities and towns.

Market Interest in Procions Sparks Arnold, Hoffman Plant Plans

In response to demand for Procion dyes, which are described as "a completely new break in dyestuffs manufacture", Arnold, Hoffman & Company, Inc has announced plans to set up a plant for their manufacture at the site of the company's multi-products plant at Dighton, Mass. While details of capacity, etc, are now in the blueprint stage, management expects that the new plant will begin to take physical shape in May, 1957, and will go into active production in early autumn.

The Procion dyes, developed by ICI and soon to be produced in the USA by Arnold, Hoffman, are said to be of an unprecedented type. According to Arnold, Hoffman, their introduction climaxes more than half a century of dyestuffs research to find a means whereby simple dyes with low physical affinity for cellulosic fibers could be synthesized—and then could be induced to react with the fiber to produce a very high degree of wet fastness.

Reaction and fixation between Procions and cellulosic fibers reportedly proceeds rapidly under alkaline conditions without the use of heat, thereby making it possible to apply them to cottons or linens by novel cold-dyeing techniques in conventional dyeing machinery. Hence the use of Procions is said to assure a significant improvement in control over the dyeing process, together with savings in steam and improvement in dyehouse conditions.

At present, the Procion color range includes a yellow, a blue, and a brilliant red. These colors can be dyed in pale as well as heavy shades reportedly possessing high fastness to light and high fastness to washing. Additions to the Procion list of colors are expected in the near future.

Brilliance, simplicity of application, and good fastness besides their technical merits and the novel dyeing principles involved in their application are cited by the manufacturer as the outstanding features of Procion dyestuffs.

Arnold, Hoffman presently distributes Procions and will maintain supplies from ICI until the new Dighton plant is in full production.

New Library for Clemson Textile School in '57

The Clemson College School of Textiles has announced that a three-year-old provision by the Sirrine Foundation has been realized with the opening of the Sirrine Library in Sirrine Hall. Lack of space for existing college functions delayed library plans until completion of the new agricultural center last year.

An annual allowance of $1000 has been used for new books and library equipment, in addition to the salary of Lois Reiss, librarian. Books have been catalogued according to the Library of Congress system. All general textile publications are available, with bound volumes reverting to 1932.

The library contains a 24-by-60 foot main reading room, librarian's office, and small workroom. The rooms have new cellotex ceilings, asphalt tile floor, fluorescent lighting, oak tables, chairs and counter-high cabinets of soft-finish natural oak. The cabinets and tables were made in the college services workshop.

NY Alumni of Textile Colleges to Meet

The first joint meeting and banquet of the Textile College Alumni of New York will be held at 6 pm, March 21 at the Tavern-on-the-Green, Central Park West at 67th St, New York, NY.

The meeting, which will have as its theme, "Meet the President", is designed to afford textile college alumni an opportunity to meet socially with the heads of prominent textile corporations, as well as fellow alumni, while focussing attention on the importance of textile education and textile industry in planning careers for young people.

Among those who have accepted invitations to attend the affair are: Robert T Stevens and Joseph Sutherland of J P Stevens & Co, Inc; T Scott Avery, Wellington Sears Co; Ellis Leach, Collins & Aikman; Marvin Cross, Greenwood Mills, Inc; and Jack Schwab, United Merchants and Manufacturers.

The innovation of having the New York chapters of the various textile college alumni organizations meet collectively for the meeting is expected to produce a banner turnout. Chiefly concerned will be the New York alumni chapters of Lowell Technological Institute, New Bedford Institute of Textiles and Technology, North Carolina State College School of Textiles and Philadelphia Textile Institute. However, alumni of all textile colleges are invited to attend.

Reservations at $5.75 may be made with Eugene Batkin, treasurer, 200 W 90th St, New York, NY.

Standard Test Cottons Available

A set of standard test cottons is now available through the Cotton Division of the Agricultural Marketing Service of the U S Department of Agriculture for use in the calibration of instruments for measuring cotton fiber properties.

The program for estimating the standards was developed by the International Cotton Calibration Standards Committee, which will continue to have the responsibility for testing and certifying. Blending, preparation, and distribution of the samples will be carried on by AMS's Cotton Division.

The cotton calibration standards now consist of three samples, having high, medium and low readings in the Micronaire test for fineness, and the Pressley test for strength. Later on, additional fiber property tests may be included in the program.

Standard test methods of the ASTM are used to establish the calibration cotton readings. When standard test procedures of the International Organization for Standardization (ISO) become available, they will be used as the official test methods in the calibration standards program.

Cornell Again Offering Lab Course in Electron Microscope

The Cornell Summer Laboratory Course in Techniques and Applications of the Electron Microscope will be given again this summer from June 17 to June 29 by the Laboratory of Electron Microscopy in the Department of Engineering Physics, College of Engineering, Cornell University. This summer the course will be given primarily for workers in the fields of physics, chemistry and metallurgy. (A session for workers in the biological sciences will be given in 1958.)

The course is designed to give members an intensive survey of basic theory and interpretation of results. The registration is limited to a small group so that ample facilities are available for each one to pursue laboratory work in his special field at an introductory or advanced level depending on his previous experience. This course is under the direction of Prof Benjamin M Siegel and further inquiries should be addressed to him at the Department of Engineering Physics, Cornell University, Ithaca, NY.

Three Reports of Armed Forces Textile Research Available

Three reports of Armed Forces research on textiles have been released for industry use through the Office of Technical Services, US Department of Commerce. One deals with a method and a machine for processing improved Dacron yarn, another with the effects of acids on Dacron and nylon, and a third with rot-resistant coatings for rubber-coated cotton fabrics.

DEVELOPMENT OF HIGH TENACITY-HEAT STABLE DACRON YARNS. R J Coskren and T T Constantine, Fabric Research Laboratories, Inc, for Wright Air Development Center. Sept, 1956. 57 pages. $1.50. (Order PB 121566 from OTS, US Department of Commerce, Washington 25.) Development of a process for converting Dacron yarn to a material of higher strength, nominal rupture elongation, and thermal stability, and a machine capable of accomplishing the improvements are described. The process, said to be economical in both equipment cost and production, involves stretching the yarn at a high temperature, holding for a short period, and then allowing free shrinkage at the desired temperature. The pilot processing machine enables hot stretching and relaxing of the yarn. Recommendations are made for construction of a commercial counterpart of the apparatus. The research was undertaken to develop Dacron as a substitute for nylon in aircraft deceleration parachutes. Nylon degrades severely at 350°F, and thus fails to meet heat degradation requirements of the Air Force.

A STUDY OF THE EFFECTS OF CHEMICALS ON THE PROPERTIES OF PARACHUTE FABRICS. J G Templeton, School of Textiles, North Carolina State College, for Wright Air Development Center. Sept, 1956. 216 pages. $4. (Order PB 121679 from OTS, US Department of Commerce, Washington 25.) Dacron showed considerably better resistance than nylon in tests of the effects of mineral acids on the two materials. In addition, acid-treated Dacron was less sensitive to light than acid-treated nylon. The parachute cloths were exposed to sulfuric, hydrochloric, nitric, phosphoric, sulfurous, hydrosulfuric, and nitrous acids after a literature survey disclosed that no satisfactory resistance data were available. Dacron also was unaffected by sulfur dioxide, hydrogen sulfide and oxides of nitrogen. Nylon was sensitive only to oxides of nitrogen. No satisfactory method for visual detection of acid degradation was found, although ultraviolet light showed some promise for inspection of nylon alone.

EVALUATION OF ROT-RESISTANT TREATMENTS FOR ELASTOMER-COATED FABRICS. J M Ashcroft, Engineer Research and Development Laboratories, Corps of Engineers, US Army. July, 1955. 51 pages. $1.25. (Order PB 121420 from OTS, US Department of Commerce, Washington 25.) The general conclusion was reached that choice of a rot-resistant treatment should be made only on the basis of technical information insuring the compatibility of fabric, protectant, and coating under conditions of processing, storage, and use. Preparation of specifications for treatments pends further research.

NEW PRODUCTS

Diastafor LCD

The Diastafor Department of Standard Brands Inc, 595 Madison Ave, New York 22, NY, has announced "a new improved and more concentrated product for the textile industry"—Diastafor LCD Desizing Agent.

Diastafor LCD is described as easily-diluted liquid form with all the other advantages of Diastafor. Additional advantages of the new Diastafor LCD are said to mean savings in storage and handling costs for dependable, trouble-free desizing.

Triton CF-21

A new 100%-active nonionic wetting agent and detergent, which is said to have unusually low foaming properties, has been announced by Rohm & Haas Company. This newest member of the company's family of Triton surface-active agents, Triton CF-21, is recommended by R & H for many textile wet-processing operations. Prices fob Philadelphia are as follows: bulk 32½ cents a pound; truckload of drums 34½ cents; less than truckload of drums 35½ cents; less than drums 45½ cents.

According to Robert G Thomas, in charge of the company's textile chemicals department, Triton CF-21 is recommended especially as a penetrant in desizing baths, a detergent and penetrant for continuous boil-off, as well as for use in pigment padding of vats or pigments and in dyeing direct, basic, and dispersed colors. Technical notes describing properties and applications are available upon request.

General Calendar

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE
Gordon Research Conference on Textiles, July 8-12, Colby Jr College, New London, NH

AMERICAN OIL CHEMISTS SOCIETY
Spring, 1957 (Spring meeting, New Orleans); Sept 30-Oct 2, 1957 (Fall meeting, Cincinnati); Apr 21-23, 1958 (Memphis); Oct 20-22, 1958 (Chicago); Spring, 1959 (New Orleans); Fall, 1959 (Los Angeles).

AMERICAN MATERIAL HANDLING SOCIETY
Apr 29-May 3 (7th Materials Handling Exposition, Convention Hall, Philadelphia, Pa)

THE DRYSALTERS CLUB OF NEW ENGLAND
Apr 26 (Hotel Vendome, Boston); June 21 (Annual Outing—Wachusett Country Club, West Boylston, Mass).

THE FIBER SOCIETY
Spring Meeting—May 1-2, 1957, The Clemson House, Clemson S C; Sept 4-6 (Joint meeting with the Textile Institute—Hotel Statler, Boston, Mass)

NATIONAL ASSOCIATION OF HOSIERY MANUFACTURERS
NATIONAL KNITTED OUTERWEAR ASSOCIATION
UNDERWEAR INSTITUTE
April 29-May 3 (1957 Knitting Arts Exhibition, Atlantic City, NJ)

NATIONAL COTTON COUNCIL OF AMERICA
October 2-3 (Chemical Finishing Conference—Statler Hotel, Washington, DC)

PHI PSI FRATERNITY
April 25-27—Annual meeting, New Bedford Hotel, New Bedford, Mass.

PHILADELPHIA TEXTILE INSTITUTE ALUMNI ASSOCIATION
June 6-8 (Alumni Day, Alumni Outing, PTI Commencement)

PURDUE UNIVERSITY
May 13-15 (12th Purdue Industrial Waste Conference, Purdue Univ, Lafayette, Ind)

SYNTHETIC ORGANIC CHEMICAL MANUFACTURERS ASSOCIATION OF THE UNITED STATES
Mar 12 (Palm Terrace Suite, Hotel Roosevelt, New York, NY); May 26-28 (Annual Outing, Skytop, Pa); June 11, Sept 10, Oct 8, Nov 12 (Palm Terrace Suite, Hotel Roosevelt, New York, NY)

TEXTILE QUALITY CONTROL ASSOCIATION
March 28-29 (Spring Meeting, Clemson House, Clemson, SC)

• NAMES IN THE NEWS •

MacLean

Hodges

Goldstein

Swan

Onyx Oil & Chemical Company, Jersey City, NJ, has announced the appointment of **Philip E MacLean** to the position of sales manager of the Textile Division.

Mr MacLean has been with the company for ten years, his latest capacity being that of district manager of the New England area. Assistant to Mr MacLean is Paul Jacobs.

The board of directors of the Nopco Chemical Company has elected four new company officers.

George H Faux, formerly Nopco's secretary, becomes the new treasurer. He fills the post vacated by **Albert A Vetter**, who recently retired after 38 years with the company.

Alfred O Brookes, formerly assistant secretary, becomes the new secretary. **Robert M Urich**, formerly budget director, becomes assistant treasurer. **Julius J Denzler**, head of Nopco's Legal Department, becomes assistant secretary.

John H Costello, president of The Lowell Sun Publishing Company, has been elected to the board of directors of the Lowell Technological Institute Research Foundation by the Foundation trustees.

The Foundation, established in 1950 as an independent but affiliated enterprise to handle all sponsored testing, development, and research for the Institute, conducts its work under contract with many governmental and industrial agencies.

H K Vanderhoef has been appointed vice-president in charge of sales by Kay-Fries Chemicals, Inc, New York, NY, manufacturers of organic intermediates.

Mr Vanderhoef has been in charge of the market development program of Kay-Fries since 1953. He joined Kay-Fries in 1943 and has served in the research, manufacturing, and purchasing departments.

Together with an announcement of the purchase of additional equipment to specification for the production of super fine emulsions for textile processing, Moretex Chemical Products Inc, Spartanburg, SC, has made known the following personnel moves:

Robert Hodges, formerly with Reeves Brothers, has been named office manager and comptroller; **Oliver Goldstein** has been shifted from plant manager to technical assistant to the sales manager, where his duties will be in field development and new products; and **Donald Davis** has been named plant superintendent in charge of plant operations.

The following changes in the field sales organization of the Industrial Chemicals Division of Olin Mathieson Chemical Corporation have been announced:

W D Marshall, who has been district manager in the Philadelphia sales office, is being assigned to new sales duties of a special nature. Mr Marshall, a veteran of 37 years with Olin Mathieson, is succeeded as district manager of the Philadelphia territory by **J G Johns**, who has been with the company in various sales capacities for 16 years, most recently as assistant manager in the Philadelphia office.

Victor C Fusco has been appointed a sales representative in Pittsburgh, working under Mr Johns. He will represent the division's full line of industrial chemicals in that area. Mr Fusco joined Olin Mathieson in 1947 and was recently in charge of development of hydrazine products for the company in Baltimore.

Don Threlkeld has been appointed a sales representative in the Chicago office under **N F Wilmot**, Chicago district manager. A chemical engineer, Mr Threlkeld has been employed in the company's organic chemicals plant at Brandenburg, Ky, and prior to that in the research department at Niagara Falls, NY.

Thomas H Swan recently joined the staff of the Southern Utilization Research Branch of the Agricultural Research Service, USDA. He is stationed at the Southern Regional Research Laboratory in New Orleans, La, and has been named assistant head of the Cotton Fiber Section.

Dr Swan was formerly assistant chief of the Research and Development Division of the Office of Synthetic Rubber, in which capacity he was responsible under the chief for the activities of five branches. Prior to that he was a research chemist on the staff of Mellon Institute, Pittsburgh, Pa, where he carried on investigations in the fields of textiles, synthetic resins, and fabric laminations and was responsible for the work that led to a basic patent on the "fused" collar. In his work at the Southern Utilization Research Branch, Dr Swan is returning to textile investigations, as the Cotton Fiber Section is engaged in studies of the fundamental properties of the cotton fiber.

The appointment of **Herman Zagerinsky** as manager of production of Sole Chemical Corp, Chicago, Ill, was recently announced by its president, Solomon Epstein. Mr Zagerinsky, who was formerly in production control at Emulsol Chemical Corp and at Gross Egg Company, will now have charge of various production projects of Sole Chemical.

Midge Wilson has been appointed assistant to **Estelle M Tennis**, executive director of The Color Association of the United States Inc.

Among other duties, Miss Wilson will assist in developing the Association's expansion program to serve additional segments of industry in which color is a growing styling and sales force. She was merchandising promotion coordinator for *Seventeen*, and prior to that, fashion coordinator for B Blumenthal & Co.

Pruitt

The Procter & Gamble Company has announced the appointment of **Roger L Pruitt** to its Textile Research Department in Cincinnati, Ohio.

Mr Pruitt was associated with Burlington Industries for a short time before serving with the Army Quartermaster Corps, working with the Research and Development Field Evaluation Agency at Ft Lee, Va.

Several new assignments in the sales department of Solvay Process Division, Allied Chemical & Dye Corporation, were announced on February 25th.

Raymond B Anthony has been appointed manager of the newly formed Special Chemicals Section, which combines the former Special Alkalies and Ammonium and Potassium Products Sections. Mr Anthony was formerly manager of the Special Alkalies Section.

Fred P Boehm, who has been located at Solvay's central sales office, New York, moves to the company's Pittsburgh, Pa, sales branch.

Under the new set-up **Solon D Fisher** will serve as technical assistant to the manager of the newly formed section. **Joseph L Hake** also has been named assistant to Mr Anthony, while **George R Barclay** becomes assistant to the manager of Solvay's Organic Chemicals section.

Mr Hake has been a salesman at the Detroit branch since 1949. Mr Barclay had been serving as assistant to the manager of the Special Alkalies Section.

Leech

Paul N Leech has been appointed sales representative in the Mid-Atlantic sales territory of Emery Industries, Inc.

Mr Leech's territory includes central and northeastern Pennsylvania, northern New Jersey, western Maryland, and central New York State. He will be responsible for the sale of Emery's complete line of fatty acids.

Prior to joining Emery, Mr Leech was a sales representative for M & R Dietetic Laboratories in the Greater Toledo area.

Wiggins

Roy D Wiggins has been appointed to the research and development section of the Textile Division, The Hilton-Davis Chemical Company.

Prior to joining Hilton-Davis, Mr Wiggins was associated with Kendall Mills in Slatersville, RI, and Bethune, SC, and with the Rock Hill Printing and Finishing Company.

Schwarz

Herman L Schwarz has been promoted to the position of New York District sales manager for textile dyestuffs and chemicals, Sandoz, Inc, 61 Van Dam Street, New York. Previously assistant sales manager for the New York office, Mr Schwarz has been with Sandoz for 29 years. From 1940 to 1950 he headed the New York Application Laboratories.

On February 1st, **Rhoderick R Blue** joined the Robinson Thread Company and the Cranska Thread Company as a sales representative in New England.

He formerly was a technical salesman with the Warwick Chemical Division of the Sun Chemical Corporation.

Harold K Latourette has been named manager of organic research and development at Becco Chemical Division, Food Machinery and Chemical Corporation, Buffalo, NY.

Dr Latourette was previously a member of the staff of the Central Research Laboratories of Food Machinery and Chemical Corporation, in Princeton, NJ. He has been with FMC since 1951.

Louis S Potsdamer resigned on Feb 1st as director of the laboratory at Industrial By-Products & Research Co, Philadelphia after 32 years with the Company.

Book Reviews

(concluded from page 186)

HYDROGEN PEROXIDE (ACS Monograph No. 128)

Walter Schumb, Charles N Satterfield and Ralph L Wentworth
Reinhold Publishing Corp
New York, NY
Chapman and Hall, Ltd
London, 1955
xiii + 759; $16.50
15.5 x 23.5 cm

This excellent monograph is a critical and comprehensive treatise covering most of the information up to the present time concerning hydrogen peroxide and its derivatives. Unfortunately, because of space limitations, the fields of organic peroxides and biological chemistry are briefly considered. Practical techniques, such as the handling and packaging of hydrogen peroxide also are not discussed in detail.

A great mass of information which is of decided value to the textile industry is presented. The beginning chapters treat with the formation of hydrogen peroxide, its concentration and purification, and with the structural materials used in its preparation and its handling. These chapters are followed by chapters dealing in great detail with the physical and chemical properties, as well as the decomposition and stabilization processes. The final chapters are concerned with a thorough-going discussion of the analytical procedures, the uses of hydrogen peroxide and the inorganic peroxy compounds.

A valuable feature of this monograph is the abundant number of references given at the end of each chapter. The book is attractively printed; the many figures and tables add to the understanding of the discussions. —VL.